VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the **reissuance** of the VPDES permit listed below. This permit is being processed as a **Major, Municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et.seq. The discharge results from the operation of a 1.25 MGD WWTP, consisting of: Influent pump station, influent Isco Unimag in pipe flow meter, mechanical (rotating) and manual (bypass) bar screen, aerated grit channel, aerated flow equalization tank, five sequencing batch reactors, dual chlorinators and dual chlorine contact tanks, dual sulfonators for dechlorination, effluent Parshall flume with Isco 3010 ultrasonic flow meter, effluent discharge diffuser, three aerobic digesters, dual sludge pumps, sludge belt press, septage receiving/screening station, septage holding tank, dual vacuum assisted drying beds, alarm system, and 500 kw generator. The collection system includes ten pump stations in addition to the main (influent) pump station. This permit action consists of limiting pH, BOD_5, suspended solids, ammonia nitrogen, total residual chlorine, E.coli, and dissolved oxygen; and including special conditions regarding biosolids use and disposal, compliance reporting, control of significant dischargers, water quality criteria monitoring, and other requirements and special conditions. The effluent limitations are being tiered for future expansions to 1.5 MGD, 2.0 MGD, and 2.5 MGD. SIC Code: 4952.

1. Facility Name and Address:
Fort Chiswell Wastewater Treatment Plant
613 Locust Hill Road
Max Meadows, VA 24360

Facility Contact:
Don Crisp, Jr., Director
Phone: (276) 637-4544
E-mail: dtcrisp@wytheco.org

2. Permit No. VA0074161
(Previous) Effective Date: November 28, 2011
(Previous) Expiration Date: November 27, 2016

3. Owner: Wythe County Board of Supervisors
Owner Contact: R. Cellell Dalton
Title: County Administrator
Telephone No: 276-223-6020
Owner Address: 340 South Sixth Street
Administration Building
Wytheville, VA 24382-2598

4. Application Complete Date: June 17, 2016
Permit Drafted By: Fred M. Wyatt _____ Date: _____
Reviewed By: Steve E. Arthur Date: 7/27/2016
Public Comment Period Dates: from _____ to _____

5. Receiving Stream Name: Reed Creek; River Mile: 9-RDC014.11; Basin: New River; Subbasin: None; Section: 2; Class: IV; Special Standards: v (New-5 is listed in the Water Quality Standards as a special standard but is not applicable to this section). Lat.: 36°57'32"; Long.: 80°55'40"

7-Day, 10-Year Low Flow (7Q10): 32.3 MGD (June – Dec.)
1-Day, 10-Year Low Flow (1Q10): 26.5 MGD (June – Dec.)
7Q10 High Flow: 44.0 MGD (Jan. - May)

1Q10 High Flow: 34.9 MGD (Jan. - May)
30-Day, 10-Year Low Flow (30Q10): 37.2 MGD (June-Dec.)
30Q10 High Flow: 58 MGD (Jan.-May)
30-Day, 5-Year Low Flow (30Q5): 39.7 MGD
Harmonic Mean Flow (HM): 85.3 MGD

Tidal? No

On 303(d) list? Yes (See Item # 13 below)

6. Operator License Requirements: Class II

7. Reliability Class: III

8. Permit Characterization:
( ) Private ( ) Federal ( ) State (X) POTW ( ) PVOTW
( ) Possible Interstate Effect ( ) Interim Limits in Other Document

9. Attach a schematic of wastewater treatment system, and provide a general description of the activities of the facility.

Discharge Description

OUTFALL NUMBER	DISCHARGE SOURCE (1)	TREATMENT (2)	FLOW (3)
001	Communities of Ft. Chiswell and Max Meadows	See Page 1 above, first paragraph	Existing: 1.25 MGD Future: 1.5, 2.0, & 2.5 MGD

(1) List operations contributing to flow (2) List treatment units
(3) Design flow

10. Sewage Sludge Use or Disposal: The sludge disposal plan consists of: Disposal at the New River Solid Waste Management Area Landfill in Pulaski County.

11. Discharge Location Description: See attached Max Meadows, VA Quadrangle, Number: 053B.

12. Material Storage: None reported

13. Ambient Water Quality Information: The segment is not supporting the fish consumption use goal. A VDH fish consumption restriction was imposed on 12/02/2004 due to PCBs in fish tissue. A TMDL is presently being developed.

14. Antidegradation Review & Comments:
Tier 1 _X_ Tier 2 ____ Tier 3 ____

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with a Tier determination. The original effluent limitations for this facility were based on Tier 2 restrictions, since the receiving stream at that time was considered Tier 2 waters. However, due to the stream impairment due to PCBs, the stream is now considered Tier I.

15. Site Inspections: Technical Inspection by Allen Cornett on 6/09/2015;
Technical Inspection by Wade Carico on 12/12/2012;
Reconnaissance Inspection by Wade Carico on 9/12/2012;

16. Effluent Screening & Limitation Development: Since the receiving stream flows have not significantly changed since the previous issuance, effluent limitations are not being reevaluated.

Basis for Effluent Limitations: 1.25 MGD

PARAMETER	BASIS FOR LIMITS *	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow	NA	NL	NA	NA	NL	Continuous	Totalizing Indicating & Recording
PH	2	NA	NA	6.0 SU	9.0 SU	1/Day	Grab
BOD_5	1,5	30 mg/l 140 kg/l	45 mg/l 210 kg/d	NA	NA	3 Days/Week	24 Hour Comp.
Total Suspended Solids	1	30 mg/l 140 kg/d	45 mg/l 210 kg/d	NA	NA	3 Days/Week	24 Hour Comp.
Total Residual Chlorine**	2,5	0.018 mg/l	0.020 mg/l	NA	NA	4/Day at 2 Hour Intervals	Grab
E.coli (n/100 ml)	2	126 Geometric Mean	NA	NA	NA	4/Month Between 10:00 am & 4:00 pm	Grab
Ammonia Nitrogen	2,5	8.0 mg/l	11 mg/l	NA	NA	3 Days/Week	24 Hour Comp.
Dissolved Oxygen	2,5	NA	NA	6.0	NA	1/Day	Grab

Basis for Effluent Limitations: 1.50 MGD

PARAMETER	BASIS FOR LIMITS *	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow	NA	NL	NA	NA	NL	Continuous	Totalizing Indicating & Recording
PH	2	NA	NA	6.0 SU	9.0 SU	1/Day	Grab
BOD_5	1,5	30 mg/l 170 kg/l	45 mg/l 260 kg/d	NA	NA	3 Days/Week	24 Hour Comp.
Total Suspended Solids	1	30 mg/l 170 kg/d	45 mg/l 260 kg/d	NA	NA	3 Days/Week	24 Hour Comp.
Total Residual Chlorine**	2,5	0.016 mg/l	0.018 mg/l	NA	NA	4/Day at 2 Hour Intervals	Grab
E.coli (n/100 ml)	2	126 Geometric Mean	NA	NA	NA	4/Month Between 10:00 am & 4:00 pm	Grab
Ammonia Nitrogen	2,5	6.9 mg/l	9.2 mg/l	NA	NA	3 Days/Week	24 Hour Comp.
Dissolved Oxygen	2,5	NA	NA	6.0	NA	1/Day	Grab

Basis for Effluent Limitations: 2.0 MGD

PARAMETER	BASIS FOR LIMITS *	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow	NA	NL	NA	NA	NL	Continuous	Totalizing Indicating & Recording
PH	2	NA	NA	6.0 SU	9.0 SU	1/Day	Grab
BOD_5	1,5	30 mg/l 230 kg/l	45 mg/l 340 kg/d	NA	NA	3 Days/Week	24 Hour Comp.
Total Suspended Solids	1	30 mg/l 230 kg/d	45 mg/l 340 kg/d	NA	NA	3 Days/Week	24 Hour Comp.
Total Residual Chlorine**	2,5	0.015 mg/l	0.017 mg/l	NA	NA	4/Day at 2 Hour Intervals	Grab
E.coli (n/100 ml)	2	126 Geometric Mean	NA	NA	NA	4/Month Between 10:00 am & 4:00 pm	Grab
Ammonia Nitrogen	2,5	5.2 mg/l	7.0 mg/l	NA	NA	3 Days/Week	24 Hour Comp.
Dissolved Oxygen	2,5	NA	NA	6.0	NA	1/Day	Grab

Basis for Effluent Limitations: 2.5 MGD

PARAMETER	BASIS FOR LIMITS *	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow	NA	NL	NA	NA	NL	Continuous	Totalizing Indicating & Recording
PH	2	NA	NA	6.0 SU	9.0 SU	1/Day	Grab
BOD_5 (June-Nov.)	1,5	30 mg/l 280 kg/l	45 mg/l 430 kg/d	NA	NA	3 Days/Week	24 Hour Comp.
Total Suspended Solids	1	30 mg/l 280 kg/d	45 mg/l 430 kg/d	NA	NA	3 Days/Week	24 Hour Comp.
Total Residual Chlorine**	2,5	0.012 mg/l	0.013 mg/l	NA	NA	1/Every 2 Hours	Grab
E.coli (n/100 ml)	2	126 Geometric Mean	NA	NA	NA	4/Month Between 10:00 am & 4:00 pm	Grab
Ammonia Nitrogen (June-Dec.)	2,5	4.4 mg/l	5.9 mg/l	NA	NA	3 Days/Week	24 Hour Comp.
Ammonia Nitrogen (Jan.- May)	2,5	7.1 mg/l	9.5 mg/l	NA	NA	3 Days/Week	24 Hour Comp.
Dissolved Oxygen	2,5	NA	NA	6.0	NA	1/Day	Grab

* 1. Federal Effluent guidelines
2. Water Quality-based Limits:
3. Best Engineering Judgment
4. Best Professional Judgment
5. Other (e.g. wasteload allocation model)

****Additional TRC Limitations and Monitoring Requirements (PART I.B. of Permit), for 1.25, 1.5, and 2.0 MGD Facilities**

1. The permittee shall monitor the Total Residual Chlorine (TRC) at the outlet of each operating chlorine contact tank, 4/day at 2 hour intervals.
2. No more than twelve ((12) of all samples for TRC taken at the outlet of each chlorine contact tank shall be less than 1.0 mg/l for any one calendar month.
3. No TRC sample collected at each outlet of the chlorine contact tank shall be less than 0.6 mg/l.
4. If dechlorination facilities exist, the samples above shall be collected prior to dechlorination.
5. If chlorine disinfection is not used, E.coli shall be limited and monitored by the permittee as specified below and this requirement, i f applicable, shall substitute for the TRC and E.coli requirement delineated elsewhere in Part I of this permit:

	Discharge Limitations		Monitoring Requirements	
	Monthly Avg.	Weekly Avg.	Frequency	Sample Type
E.coli (N/100ml)	126*	NA	5 Days/Week**	Grab

* Geometric Mean ** Between 10:00 a.m. and 4:00 p.m.

****Additional TRC Limitations and Monitoring Requirements (PART I.B. of Permit), for 2.5 MGD Facility:**

1. The permittee shall monitor the Total Residual Chlorine (TRC) at the outlet of each operating chlorine contact tank, once every 2 hours, by grab sample.
2. No more than thirty six (36) of all samples for TRC taken at the outlet of each chlorine contact tank shall be less than 1.0 mg/l for any one calendar month.
3. No TRC sample collected at each outlet of the chlorine contact tank shall be less than 0.6 mg/l.
4. If dechlorination facilities exist, the samples above shall be collected prior to dechlorination.
5. If chlorine disinfection is not used, E.coli shall be limited and monitored by the permittee as specified below and this requirement, if applicable, shall substitute for the TRC and E.coli requirement delineated elsewhere in Part I of this permit:

	Discharge Limitations		Monitoring Requirements	
	Monthly Avg.	Weekly Avg.	Frequency	Sample Type
E.coli (N/100ml)	126*	NA	1/Day**	Grab

* Geometric Mean
** Between 10:00 a.m. and 4:00 p.m.

17. Basis for Sludge Use & Disposal Requirements: VPDES Permit Regulation, 9VAC25-31-100 P; 220 B.2.; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

18. Antibacksliding Statement: Since no effluent limitations are being relaxed in this reissuance, the antibacksliding provisions of the Permit Regulation (9 VAC 25-31-220.1) do not apply.

19. Compliance Schedule: NA.

20. Special Conditions:

PART I.B. Special Condition – Additional (TRC) Limitations and Monitoring Requirements
Rationale: Required by Sewage Collection and Treatment Regulations, 9VAC25-790. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. This ensures proper operation of chlorination equipment to maintain adequate disinfection.

PART I.C. Special Condition - Compliance Reporting
Rationale: Authorized by VPDES Permit Regulation, 9VAC25-31-190 J 4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

PART I.D. Special Condition – Control of Significant Dischargers
Rationale: VPDES Permit Regulation, 9VAC25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to meet specified regulations.

PART I.E. Whole Effluent Toxicity Testing
Rationale: VPDES Permit Regulation, 9 VAC25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.

PART I.F. PCBs Minimization and Monitoring
Rationale: State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, Subpart 131.11.

PART I.G. Other Requirements and Special Conditions

1. **95% Capacity Reopener**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-200 B 4 for all POTW and PVOTW permits

2. **Indirect Dischargers**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-200 B 1 and B 2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

3. **CTC, CTO Requirement**
Rationale: Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790.

4. **Operation and Maintenance Manual Requirement**
Rationale: Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190

5. **Licensed Operator Requirement**
Rationale: The VPDES Permit Regulation, 9VAC25-31-200 C and the Code of Virginia § 54.1-2300 et seq, Board for Waterworks and Wastewater Works Operators and Onsite Sewage System Professional Regulations (18VAC160-20-10 et seq.), require licensure of operators.

6. **Reliability Class**
Rationale: Required by the Sewage Collection and Treatment Regulations, 9 VAC25-790 for all municipal facilities.

7. **Treatment Works Closure Plan**

Rationale: This condition establishes the requirement to submit a closure plan for the treatment works if the treatment facility is being replaced or is expected close. This is necessary to ensure treatment works are properly closed so that the risk of untreated waste water discharge, spills, leaks, or other exposure to raw materials is eliminated and water quality is maintained. Section 62.1-44.21 requires every owner to furnish when requested plans, specifications, and other pertinent informations as may be necessary to determine the effect of the wastes from this discharge on the quality of state waters, or such other information as may be necessary to accomplish the purpose of the State Water Control Law.

8. **Section 303(d) List (TMDL) Reopener**
Rationale: Section 303(d) of the Clean Water Act requires the total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it in compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o(1)of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in the permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

9. **Sludge Reopener**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-220 C for all permits issued to treatment works treating domestic sewage.

10. **Sludge Use and Disposal**
Rationale: VPDES Permit Regulation, 9VAC25-31-100 P; 220 B.2.; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

11. **Water Quality Criteria Monitoring in Attachment A**
Rationale: State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of this VPDES permit.

PART II, Conditions Applicable to All Permits
Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes from the previous permit contained in the reissuance permit:

This permit has been drafted using guidance provided in the March 27, 2014 permit manual which is updated on a continual basis, resulting in

minor changes to permit requirements and conditions.

PART I C.1. - The quantification level (QL) for BOD_5 has been changed from 5 mg/l to 2 mg/l in accordance with recommendations from the Office of Water Permits and Standard Methods 22_{nd} Edition.

The special condition for submittal of an operations and maintenance Manual has been updated and dose not require DEQ approval unless requested by DEQ.

Water Quality Criteria Monitoring and Attachment A are being included since this testing was not required in the previous permit.

The PCBs Minimization and Monitoring special condition is being added in in PART I.E. See Item 13 above.

At the request of the permittee in the reissuance application, the land application option for biosolids, previously included in the VPDES Permit, is not being included in the reissuance permit. Special conditions reqarding land application of biosolids, biosolids limitations and monitoring requirements and soil monitoring requirements for land application sites have been removed.

In accordance with current agency policy to make the effective date of permits the first day of the month, the effective date of the reissued permit will be August 1, 2016 instead of July 25, 2011, based on the current expiration date. The existing permit is being administratively continued by DEQ to cover this gap.

PART II (boilerplate) of the permit has been updated to comply with the March 27, 2014 updated permit manual:

A.1.c - Added VELAP special condition which requires samples to be analyzed in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories per VPDES Permit Manual.

A.2. - Clarified that operational or process control samples or measurements do not need to follow procedures approved under Title 40 Code of Federal Regulations Part 136 or be analyzed in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories.

I.3. - Added language which allows for the Reporting of Non-Compliance activities to be submitted online in addition to reporting them by means of a telephone call.

22. Variances/Alternate Limits or Conditions: None

23. Regulation of Users: 9 VAC 25-31-280 B 9 - NA

24. Public Notice Information required by 9 VAC 25-31-280 B:

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by hand delivery, e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all the persons represented by the commenter/requester. A request for a public hearing must also include; 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit and suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION:
Name: Fred M. Wyatt
Address: DEQ, Southwest Regional Office, 355-A Deadmore Street, Abingdon, VA 24210; Phone: (276) 676-4810 E-mail: frederick.wyatt@deq.virginia.gov Fax: (276) 676-4899

25. Additional Comments:

Previous Board Action: None

Staff Comments:

Permit History: VPDES Permit No.VA0074161 for this facility was issued on June 22, 1987, was reissued on June 22, 1992; June 22, 1997; June 22, 2002; was revoked and reissued on November 28, 2006, was reissued on November 28, 2011 and has an expiration date of November 27, 2016.

Permit Fee: A permit fee is not required. Only an annual maintenance is required, to be paid by October 1 of each year.

Threatened or Endangered (T&E) Species: No T&E species have been confirmed in this section of Reed Creek. This facility is on the list for coordination with the Department of Conservation & Recreation (DCR), who have been provided with information regarding the reissuance.

Federal Storm Water Regulations: The permittee has complied with the Phase 2 requirements by submitting a VIRGINIA NO EXPOSURE CERTIFICATION FOR EXCLUSION FROM VPDES STORM WATER PERMITTING.

Public Comment: None

26. TMDL: See item # 13 above.

PLANNING CONCURRENCE FOR MUNICIPAL VPDES PERMIT

PERMIT NO. VA0074161
FACILITY: Ft. Chiswell WWTP
COUNTY: Wythe

[ ] 1. The discharge is in conformance with the existing planning documents for the area.

[ ] 2. The discharge is not addressed in any planning document but will be included, if required, when the plan is updated.

[ ] 3. Other.

_____
Regional TMDL Coordinator

_____
Date

ATTACHMENT 1

Treatment Process Diagrams & Description

ATTACHMENT C
Fort Chiswell/Max Meadows Wastewater Project
Division I
Collection System for the Community of Max Meadows

I. Gravity Sewer Line
   A. Six inch diameter - 3841 linear feet
   B. Eight inch diameter - 24213 linear feet

II. Force Main
   A. Six inch diameter force main - 8384 linear feet

Division II
Collection System for the Community of Fort Chiswell

I. Gravity Sewer Line
   A. Six inch diameter - 112 linear feet
   B. Eight inch diameter - 19786 linear feet
   C. Ten inch diameter - 4521 linear feet
   D. Twelve inch diameter - 5294 linear feet
   E. Eighteen inch diameter - 6843 linear feet
   F. Twenty-four inch diameter - 2804 linear feet

Division III
Collection System for the Area Adjacent to Interstate 81 and Between Exit Nos. 77 and 80

I. Gravity Sewer Line
   A. Six inch diameter - 68 linear feet
   B. Eight inch diameter - 16377 linear feet
   C. Ten inch diameter - 23737 linear feet

II. Force Main
   A. Four inch diameter force main - 3482 linear feet
   B. Eight inch diameter force main - 2684 linear feet

Division IV
Collection System Pump Stations

I. Pump Station No. 1
   A. Pump Station Location - Intersection of Route 614 and Railroad Avenue in the Community of Max Meadows
   B. Number of pumps - 2
   C. Type of pumps - Submersible
   D. Wet well diameter - 6 feet
      Wet well volume (pump off level to high water alarm) - 677 gallons
   E. Pump rated capacity - 190 gpm at 102 feet TDH (each pump)
   F. Pump controls - floats
   G. Ventilation - 4-inch diameter mushroom capped vent
   H. Reliability Classification - III
   I. Alarm system
      1. Functions monitored
         a. Wet well high water level
         b. Lag pump on
         c. Power outage
      2. Type of alarm - on-site audio/visual with auto dialer to site manned 24 hours per day

3. Battery backup power provided
J. Hoist provided for pump maintenance
K. Fence provided around pump station

II. Pump Station No. 2
A. Pump Station Location - Intersection of Route 750 and Route 121 south of the Community of Max Meadows
B. Number of pumps - 2
C. Type of pumps - Submersible
D. Wet well diameter - 6 feet
E. Wet well volume (pump off level to high water alarm) - 677 gallons
F. Pump rated capacity - 195 gpm at 185 feet TDH (each pump)
G. Pump controls - floats
H. Ventilation - 4-inch diameter mushroom capped vent
I. Wet well odor control system - 100 cfm fan discharging to a pit filled with pine bark mulch
J. Reliability Classification - II
K. Generator provided
1. Size - 50 KW
2. Fuel type - diesel
3. Manual power transfer switch
L. Alarm system
1. Functions monitored
a. Wet well high water level
b. Lag pump on
c. Power outage
2. Type of alarm - on-site audio/visual with auto dialer to site manned 24 hours per day
3. Battery backup power provided
M. Hoist provided for pump maintenance
N. Fence is provided around pump station

III. Pump Station No. 3
A. Pump Station Location - Adjacent to Frontage Road midway between Interstate 81 Exit Nos. 77 and 81
B. Number of pumps - 2
C. Type of pumps - Submersible
D. Wet well diameter - 10 feet
E. Wet well volume (pump off level to high water alarm) - 1616 gallons
F. Pump rated capacity - 430 gpm at 63 feet TDH (each pump)
G. Pump controls - floats
H. Ventilation - 4-inch diameter mushroom capped vent
I. Wet well odor control system - 100 cfm fan discharging to a pit filled with pine bark mulch
J. Reliability Classification - I
K. Generator provided
1. Size - 50 KW
2. Fuel type - diesel
3. Automatic power transfer switch
L. Alarm system
1. Functions monitored
a. Wet well high water level
b. Lag pump on
c. Power outage
2. Type of alarm - on-site audio/visual with auto dialer to site manned 24 hours per day
3. Battery backup power provided
M. Hoist provided for pump maintenance
N. No fence provided due to aesthetic considerations

IV. Pump Station No. 4
- A. Pump Station Location – Adjacent to Route 758 near the intersection with Frontage Road
- B. Number of pumps - 2
- C. Type of pumps - Submersible grinder
- D. Wet well diameter - 6 feet
- E. Wet well volume (pump off level to high water alarm) - 423 gallons
- F. Pump rated capacity - 86 gpm at 69 feet TDH (each pump)
- G. Pump controls - floats
- H. Ventilation - 4-inch diameter mushroom capped vent
- I. Reliability Classification - II
- J. Generator provided
  1. Size - 30 KW
  2. Fuel type - diesel
  3. Manual power transfer switch
- K. Alarm system -
  1. Functions monitored
     a. Wet well high water level
     b. Lag pump on
     c. Power outage
  2. Type of alarm - on-site audio/visual with auto dialer to site manned 24 hours per day
  3. Battery backup power provided
- L. Hoist provided for pump maintenance

Division V
Fort Chiswell/Max Meadows Sewage Treatment Works Unit Descriptions

I. Influent Pump Station

- A. Number of Pumps - 2
- B. Type of Pump - submersible
- C. Capacity - 868 gpm at 62 feet TDH (each)
- D. Wet well surface area - 16 feet by 12 feet
- E. Automatic pump alternation provided
- F. Type of pump control - constant speed
- G. Wet well ventilation system capacity - 3525 cfm
- H. Pump room ventilation system capacity - 1100 cfm

II. Bar Screen

- A. Mechanical
  1. Number - 1
  2. Capacity - 2.97 MGD maximum
  3. Clear openings - 0.25 inches
  4. Operational Control - Float
- B. Manual (By-pass around mechanical screen)
  1. Number - 1
  2. Clear opening - 2.0 inches
  3. Velocity through screen at 868 gpm - 1.24 fps

III. Aerated Grit Channel

- A. Number of channels - 1
- B. Mechanically cleaned
- C. Basin volume - 1200 cubic feet (8976 gallons)
- D. Velocity control - aeration

1. Blower capacity - 60 cfm
2. Number of blowers - 1 with backup provided by SBR blowers
3. Air control - flow control valves

IV. Sequencing Batch Reactor System

A. Number of Basins - 2
B. Total basin volume - 475,230 gallons at 10.5 feet minimum side water depth
C. Hydraulic Retention time at 0.5 MGD = 22.8 hours
D. Design criteria at 0.5 MGD
1. F/M ratio - 0.08 lb. BOD_5/lb. MLSS
2. MLSS at low water level - 4000 mg/l
3. Cycles per day - 5
4. Diffuser submergence - 10.7 feet
5. Organic loading - 303 mg/l
6. Total suspended solids loading - 303 mg/l
7. NH3-N loading - 40 mg/l

E. Type of aeration - coarse bubble diffused aeration
1. Number of blowers - 3
2. Capacity of blowers - 650 cfm each
3. Air control - flow control valve
F. Mechanical floating mixer
1. Number of mixers - 1 per basin
2. Motor HP - 10 HP
G. Decanter assembly
1. Number of decanter assemblies - 1 per basin
2. Decant rate - 1953 gpm (Average)
H. Sludge pumping to digester
1. Number of pumps - 1 per basin (Spare pump in storage)
2. Type of pump - submersible (on guide rails to facilitate removal)
3. Capacity - 100 gpm at 23 feet TDH

V. Flow Equalization
A. Number of Basins - 1
B. Volume - 362,032 gallons at 16 feet maximum side water depth
C. Type - sideline
D. Type of aeration - coarse bubble diffused aeration
E. Number of blowers - 1 with flexibility to use SBR blowers
F. Air control - flow control valve
G. Effluent returned to influent pump station
H. Overflow to chlorine contact tank

VI. Chlorination

A. Contact Basin
1. Number - 2
2. Dimensions - 52.83 feet x 5.5 feet x 9.5 feet deep (each basin)
3. Configuration - over and under baffle arrangement
4. Channel length to width - 20.7:1
5. Channel depth to width - 0.73:1
6. Contact time at decant rate of 1953 gpm - 21.1 minutes
7. Mixing - injector located on inlet line to splitter box

B. Chlorinators
1. Type of injection - vacuum type
2. Number - 2

3. Capacity - 100 lb./day
4. Dosage control - manual, with operation based on decant flow from SBR

C. Chlorinator Housing
1. Room Dimensions - 10 feet x 12 feet x 8 feet
2. Chlorine storage - provided
3. Scales - 150 lb. cylinder scales
4. Ventilation location - fan (960 cfm) located at back wall with inlet louver located in access door
5. Entrance/exit - To outside of Mechanical Building
6. Safety Equipment - Chlorine gas leak detector, air pack
7. Alarm system - monitors gas leak detector

II. Sulfur Dioxide Dechlorination
1. Type of Injection - vacuum type
2. Number - 2
3. Capacity - 100 lb./day
4. Dosage control - manual, with operation based on decant flow from SBR
5. Sulfur Dioxide Housing
a. Room Dimensions - 10 feet x 12 feet x 8 feet
b. 150 lb. Cylinder storage provided
c. Scales - 150 lb. cylinder scales
d. Ventilation location - fan (960 cfm) located at back wall with inlet louver located in access door
e. Entrance/exit - To outside of Mechanical Building
f. Safety Equipment - sulfur dioxide gas leak detector, air pack
g. Alarm system - monitors gas leak detector

III. Flow Measurement - Effluent
A. Type - Parshall flume
B. Size - 1 foot
C. Indicating, Totalizing and recording provided

IV. Effluent Discharge Diffuser
A. Location - 1979 feet elevation (bottom of Reed Creek)
B. Minimum water level - 1982 feet
C. Diffuser - 17.25 feet long 18-inch diameter ductile iron pipe with 2.5-inch diameter holes on 4 foot centers. Additional plugged holes will be located on 1 foot centers for future upgrades.

V. Sludge Handling

A. Aerobic Digestion
1. Sludge treated - WAS
2. Number of digesters - 2
3. Dimensions - 26.875 feet x 55 feet x 15 feet (each basin)
4. Volume - 165,846 gallons (each basin)
5. Retention time - 27.5 days/basin
6. Aeration - Draft tube aerators
a. Number of aerators - 2/basin
b. Oxygen transfer rate - 55.1 lb./hour/aerator at 12 feet submergence
c. Motor HP - 25 HP

B. Sludge Pumping
1. Number of pumps - 2 (one installed, one in storage)
2. Type - centrifugal, conical screw type

3. Maximum solid handling capacity - 3% solid concentration
4. Capacity - 410 gpm at 26 feet TDH (each pump)
5. Sludge route - to vacuum drying beds
6. Motor HP - 5.0 HP
7. Control - manual

C. Septage Receiving/Screening Station
1. Number of mechanically cleaned screens - 1
2. Bar spacing - 0.25 inches
3. Screening basket diameter - 31 inches
4. Screening chamber width - 40 inches
5. Type of Conveyor - screw
6. Screenings discharged to dumpster

D. Septage Holding Tank
1. Number - 1
2. Dimensions - 9 feet x 16 feet x 9.875 feet
3. Septage Pumping
   a. Number of pumps - 2
   b. Type of pumps - positive displacement diaphragm type
   c. Pump capacity - 80 gpm at 22.5 feet TDH (each pump)
   d. Discharge pipe diameter - 3 inches
   e. Septage route - to aerobic digesters
   f. Control - manual

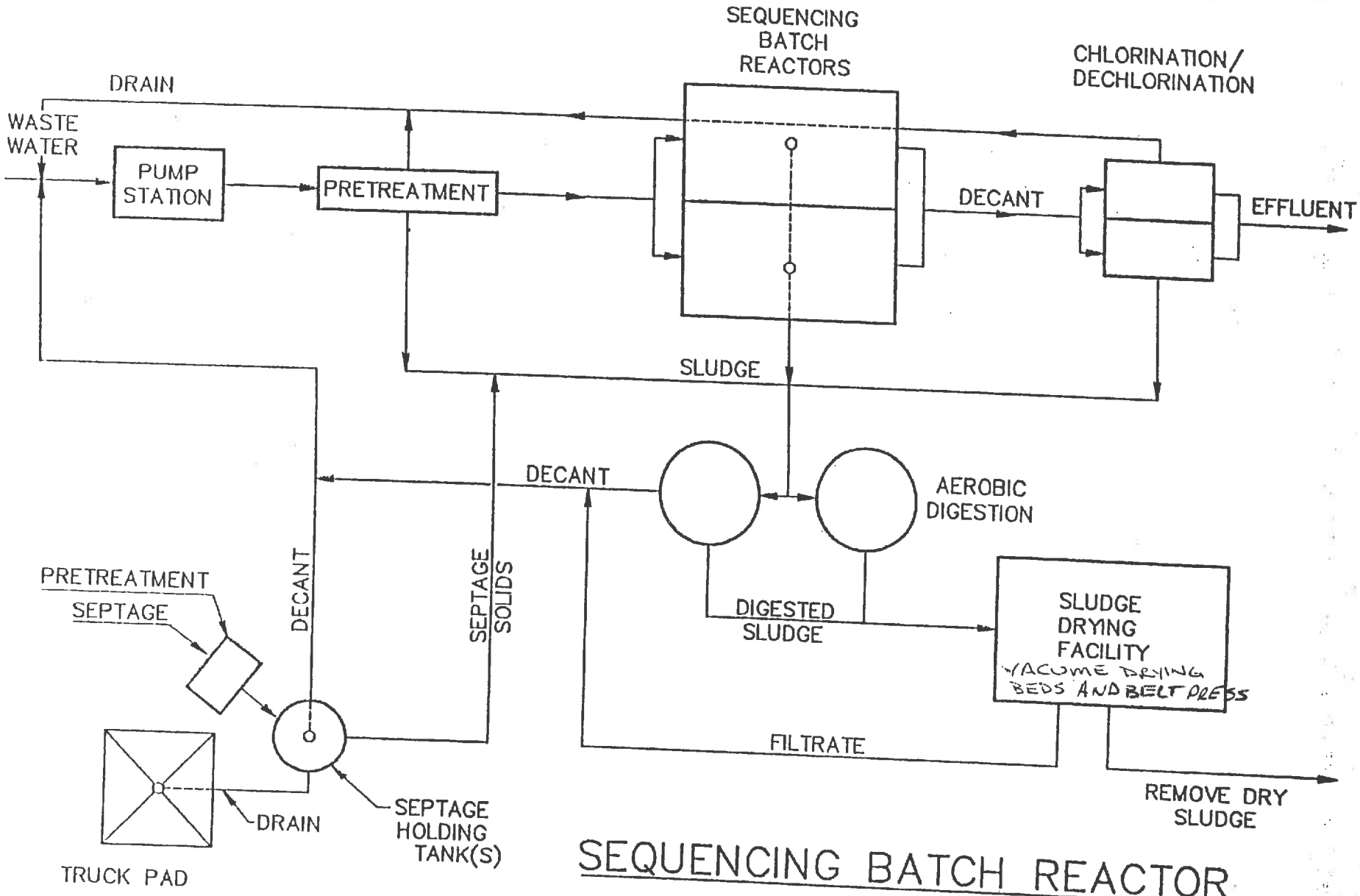
E. Vacuum Assisted Drying Beds
1. Number of beds - 2
2. Dimensions - 40 feet x 16 feet 2-inches (each bed)
3. Type of Drying Bed Cover - fiberglass
4. Type of sludge applied - aerobically digested
5. Design loading rate - 2 lb. dry solids/square foot (2.5% solids concentration)
6. Number of applications per week - 4
7. Discharge cake (% solids) - 20
8. Media - filter plates coated with aluminum oxide supported by 4-inches of No. 57 gravel
9. Number of vacuum pumps - 2
10. Vacuum pump capacity - 15 cfm at 10 inches of mercury
11. Conditioning chemical addition
   a. Location of addition - prior to sludge pump
   b. Number of chemical feed pumps - 2
   c. Type of chemical feed pumps - positive displacement
   d. Range of chemical feed pumps operation - 3 to 22 gpm
   e. Number of chemical storage tanks - 2
   f. Size of chemical storage tanks - 575 gallons each
   g. Underdrain size - 4-inch diameter
12. Dried sludge storage provided adjacent to vacuum assisted drying beds on a 40 feet x 33 feet covered concrete pad

VI. Laboratory
A. Floor Space - 784 ft^2
B. Bench Space - 162 ft^2

VII. Alarm System
A. Functions monitored
1. Influent wet well high water level
2. SBR system failure
3. Chlorine leak detector
4. Sulfur dioxide leak detector
5. Power outage

B. Type of alarm - auto-dialer to 24-hour manned site
C. Battery backup power provided
D. Lights provided for status of all major equipment

VIII. Generator
A. Size - 500 KW
B. Fuel type - diesel
C. Automatic transfer switch provided
D. Programmable automatic testing of generator provided
E. Units operated by Generator - entire treatment works.



SEQUENCING BATCH REACTOR

ANDERSON AND ASSOCIATES, Inc.
Engineers
Surveyors
Planners
Blacksburg, VA
Greensboro, NC

FIGURE 4

DRAWN	SCALE	DATE	DOCUMENT NO.
AJR	N.T.S.	2-12-99	09414-00

ACAD 9414RFA

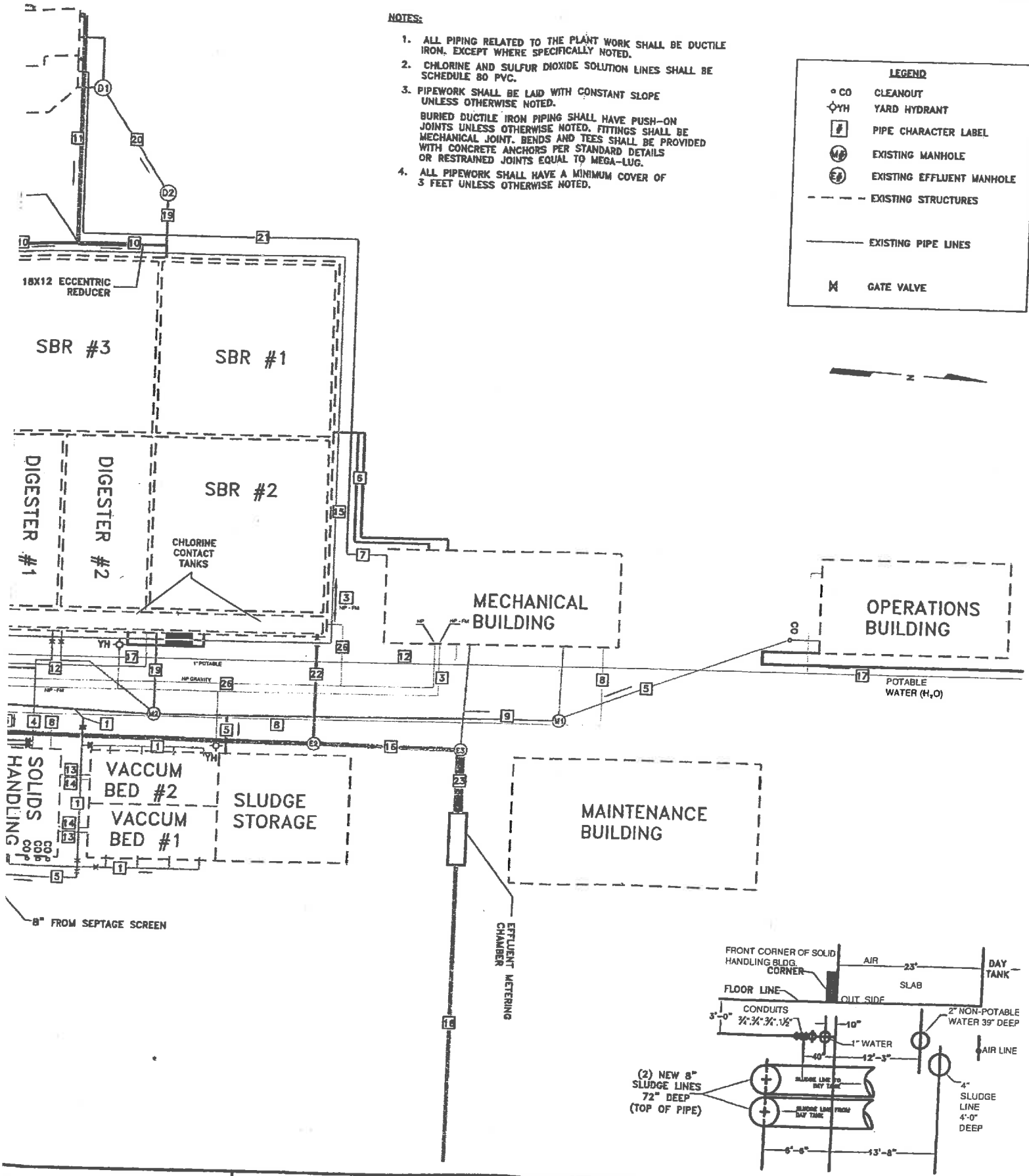
NOTES:

1. ALL PIPING RELATED TO THE PLANT WORK SHALL BE DUCTILE IRON, EXCEPT WHERE SPECIFICALLY NOTED.
2. CHLORINE AND SULFUR DIOXIDE SOLUTION LINES SHALL BE SCHEDULE 80 PVC.
3. PIPEWORK SHALL BE LAID WITH CONSTANT SLOPE UNLESS OTHERWISE NOTED.

   BURIED DUCTILE IRON PIPING SHALL HAVE PUSH-ON JOINTS UNLESS OTHERWISE NOTED. FITTINGS SHALL BE MECHANICAL JOINT. BENDS AND TEES SHALL BE PROVIDED WITH CONCRETE ANCHORS PER STANDARD DETAILS OR RESTRAINED JOINTS EQUAL TO MEGA-LUG.
4. ALL PIPEWORK SHALL HAVE A MINIMUM COVER OF 3 FEET UNLESS OTHERWISE NOTED.

LEGEND

- CO — CLEANOUT
- YH — YARD HYDRANT
- # — PIPE CHARACTER LABEL
- MH — EXISTING MANHOLE
- EM — EXISTING EFFLUENT MANHOLE
- EXISTING STRUCTURES
- EXISTING PIPE LINES
- GATE VALVE



) of SUPERVISORS
WASTEWATER
NT UPGRADE
:T 2
Y, VIRGINIA

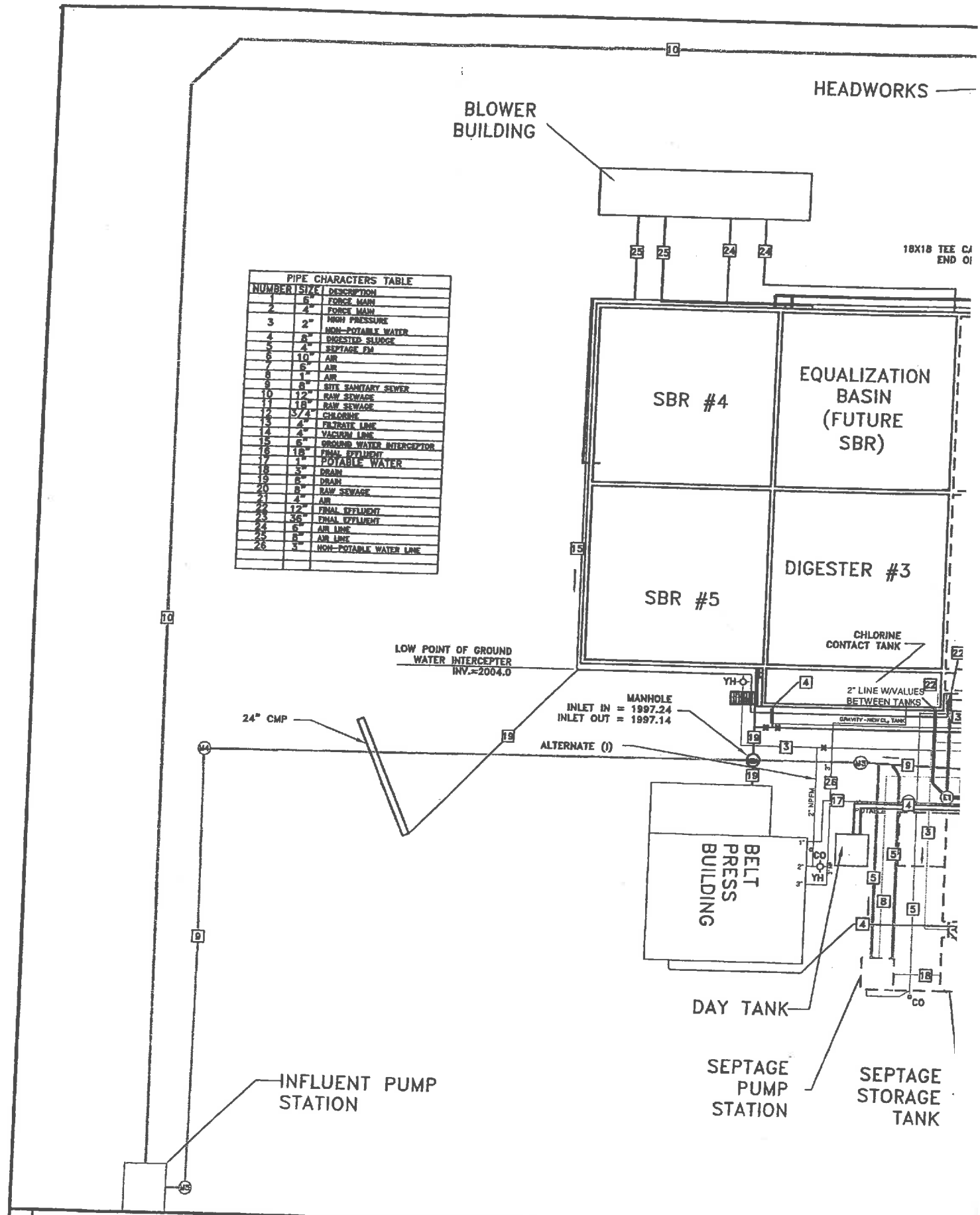
NOTE:

EXISTING INFORMATION PROVIDED BY WYTHE COUNTY BOARD OF SUPERVISORS

COMMONWEALTH OF VIRGINIA
DANIEL R. SHORTT
10/16/06
PROFESSIONAL ENGINEER

SITE PIPING PLAN

SHEET:	A-4
DATE:	8-11-2008
DRAWN BY:	GEI/CDF
CHECKED BY:	JWT
APPROVED BY:	DRS
ACAD DIR:	FT. WYTHE-
ACAD FILE:	SITE PIPI
HOR. SCALE:	1"=20'



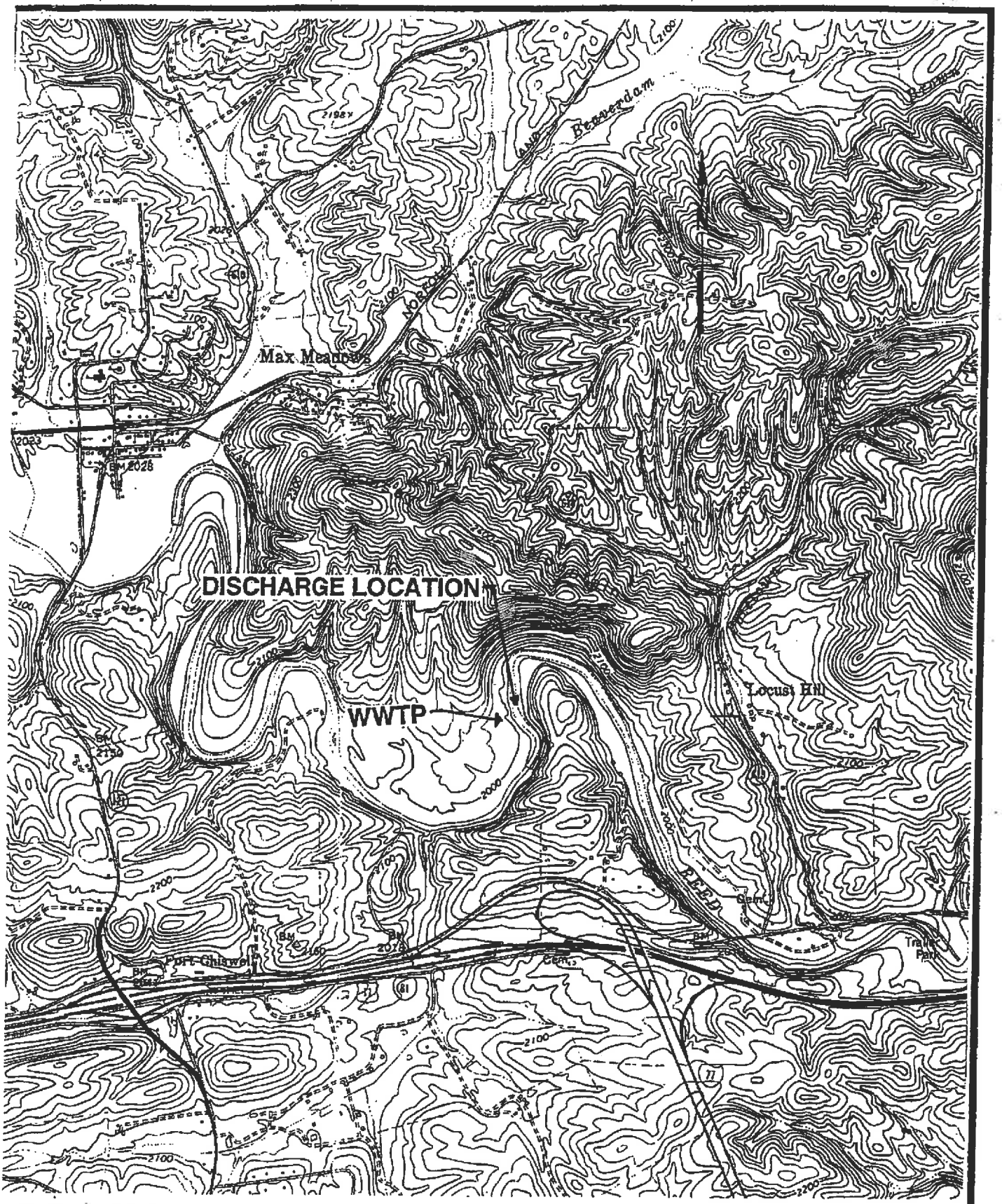
PIPE CHARACTERS TABLE		
NUMBER	SIZE	DESCRIPTION
1	6"	FORCE MAIN
2	4"	FORCE MAIN
3	2"	HIGH PRESSURE NON-POTABLE WATER
4	8"	DIGESTED SLUDGE
5	4"	SEPTAGE FM
6	10"	AIR
7	6"	AIR
8	1"	AIR
9	8"	SITE SANITARY SEWER
10	12"	RAW SEWAGE
11	18"	RAW SEWAGE
12	3/4"	CHLORINE
13	4"	FILTRATE LINE
14	4"	VACUUM LINE
15	6"	GROUND WATER INTERCEPTOR
16	18"	FINAL EFFLUENT
17	1"	POTABLE WATER
18	3"	DRAIN
19	8"	DRAIN
20	8"	RAW SEWAGE
21	4"	AIR
22	12"	FINAL EFFLUENT
23	36"	FINAL EFFLUENT
24	6"	AIR LINE
25	8"	AIR LINE
26	3"	NON-POTABLE WATER LINE

Pentree Incorporated
Consulting Engineers ©

WYTHE COUNTY BO
FORT CHISWEI
TREATMENT P
CONTI

ATTACHMENT 2

Topographic Map



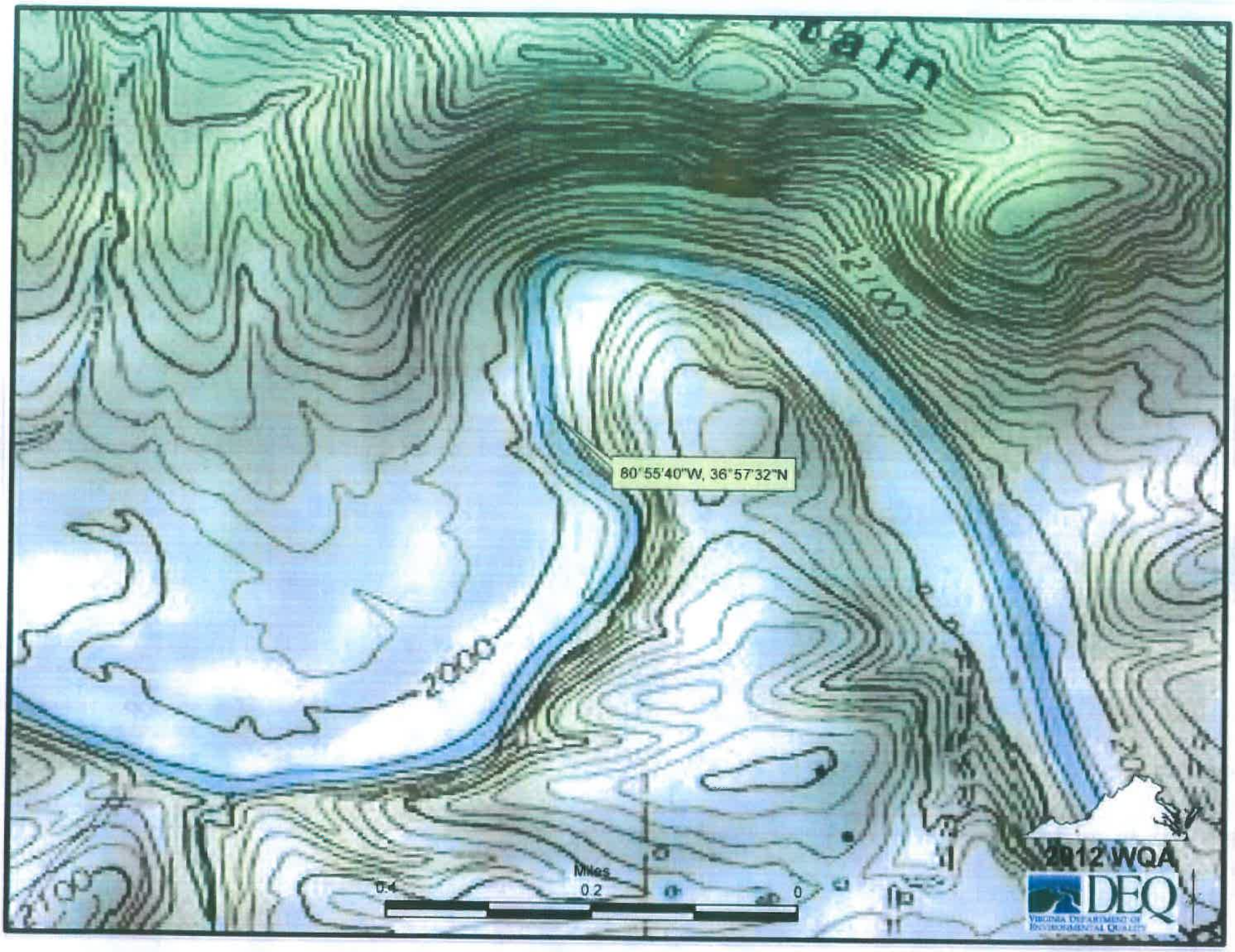
ANDERSON AND ASSOCIATES, Inc.

Engineers
Surveyors
Planners

Blacksburg, VA
Greensboro, NC
Richmond, VA
Tri-Cities, TN

DRAWN	SCALE	DATE	DOCUMENT NO.
SEC	1"=2000'	19 SEP 96	11833-002


80°55'40"W, 36°57'32"N
Miles
0 2
DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY


2100
80°55'40"W, 36°57'32"N
2000
2100
Miles
0.4
0.2
0
2012 WQA
DEQ

ATTACHMENT 3

Permit Limitations Development

Wythe County Water & Wastewater
340 South Sixth Street - Administration Building,
Wytheville, Virginia 24382-2598
Telephone (276) 223-6020
FAX (276) 223-6030

R. Cellell Dalton
County Administrator

Don T. Crisp
Director

October 4, 2011

Mr. Fred Wyatt
Dept. of Environmental Quality
PO Box 1688
Abingdon VA, 24212

Re: Permit Reissuance, VPDES Permit No. VA0074161
Comments on Draft Permit

Dear Mr. Wyatt,

Please see below the comments on the Draft Permit;

1. The Total Residual Chlorine - TRC is currently monitored per our approved O&M manual, and letter dated March 9, 2009 (attached) which addressed the TRC sampling prior to the O&M manual approval. This monitoring allows for TRC sampling at 4/Day at 2 hr intervals. Given the average flows which are approximately 0.414 mgd on average, we feel this frequency is actually more stringent and meets the intent of the permit requirements.

   As you are aware, since the Ft. Chiswell plant is an SBR facility, effluent discharges are not continuous but rather they are dictated by sequence timing or influent flow which can vary. We request that the TRC sampling requirements be written to accommodate this as per the above. Otherwise the proposed sampling will dictate staffing the plant for longer hours which we do not feel is warranted given the current plant flow and sequential operation of the facility.

2. In stream pH and temperature monitoring – You noted that the nearest available stream data is for five miles downstream and the average is a pH of 8.5, which appears high in your opinion. You noted you have estimated the average stream pH at 8.1 per the calculations, which benefits us in regards to calculating the Ammonia-Nitrogen limits. Although I understand your concern in estimating the stream pH, I do not see how the proposed monitoring will have any real validity or if it even meets the scientific methods necessary to calculate such data. In addition, obtaining a sample at the point of complete mix would be highly

subjective and vary greatly due to the duration of the SBR decants and the many stream variables such as velocity, flow, level, temperature, etc. Please advise how this will meet the criteria for proving or disproving the average you have estimated in the calculations. If this does not meet any approved methods for establishing such data, we request that the proposed monitoring be removed from the permit requirements.

Should you have any questions or need additional information, please contact me.

Sincerely,

Donald T Crisp Jr.
Director, Water & Wastewater

Wythe County Water & Wastewater

340 South Sixth Street - Administration Building,
Wytheville, Virginia 24382-2598
Telephone (276) 223-6020
FAX (276) 223-6030

R. Cellell Dalton
County Administrator

Don T. Crisp
Director

March 9, 2009

Mr. Allen Newman
Dept. of Environmental Quality
PO Box 1688
Abingdon VA, 24212

Re: VPDES permit # VA0074161, Ft. Chiswell WWTP,
TRC monitoring

Dear Allen,

As per our discussions, I have spoke to Mr. Doss and Mr. Carrico regarding the frequency of sampling for TRC as outlined in the permit special conditions. The special conditions require the permittee to monitor TRC at a frequency of 4/Day at 4 hour intervals for the 1.5 to 2.0 mgd facility. This condition would effectively require staffing the facility a minimum of 12 hrs per day.

Currently, the flows at the facility are less than 0.6 mgd and the plant is adequately staffed at 8 hrs per day. TRC samples are obtained at a frequency of 4/Day at 2 hour intervals, when SBR decant occurs.

Per our discussions, the intent was to obtain 4 samples per day, during normal operating hours, and not to extend the staffing time required in order to obtain a fourth sample. We feel that the current sampling frequency is more stringent and meets the intent of the permit especially given the daily flow at the facility is less than 0.75 mgd, in which case the special condition only requires 3 samples at 4 hour intervals.

Should flows increase as a result of new developments, the county will evaluate the plant staffing and TRC sampling frequency as necessary to comply with the permit and operating hours. The draft O&M manual will be updated to reflect this once we have received a letter from you stating that this is acceptable.

Should you have any questions or need additional information, please contact me.

Sincerely,

Donald T Crisp Jr.
Director, Water & Wastewater

F/don/letters/DEQ-TRCsampling march 2009

Calculation of Total Ammonia Nitrogen Limits

Facility Name: Ft. Chiswell WWTP
VPDES Permit No: VA0074161
Stream Name: Reed Creek
Stream Tier Designation: II

NH_3-N limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human Health standards are not applicable for ammonia.

The following stream parameter values are being used for the calculations. The dry season is June - December and the wet season is January - May.

Dry Season pH = 8.1
Wet Season pH = 8.1
Dry Season Temperature (deg.C) = 22
Wet Season Temperature (deg.C) = 12

The ammonia nitrogen water quality standards (WQS) are:

Acute: AC_{dry} = 6.95 AC_{wet} = 6.95

Chronic: CC_{dry} = 1.29 CC_{wet} = 2.10

The following flows apply:

Q_e = Design Flow of STP(MGD) = 1.25
Q_{s-1} = 1Q10 Flow (MGD) = 26.5
Q_{s-1w} = 1Q10 High Flow (MGD) = 34.9
Q_{s-30} = 30Q10 Flow (MGD) = 37.2
Q_{s-30w} = 30Q10 High Flow (MGD) = 58

The water quality wasteload allocations (WLAs) are calculated as follows:

f = fraction of stream flow to use from MIX Program

Acute:

$$\text{Dry } WLA_a = [AC_{dry}((f)Q_{s-1} + Q_e) - (f)(Q_{s-1})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Dry } WLA_a = [6.95((.25)(.38)(26.5+1.25) - (\ )(\ )(\ )] / (1.25) \text{ mg/l}$$
$$\text{Dry } WLA_a = 14.7 \text{ mg/l}$$

$$\text{Wet } WLA_a = [AC_{wet}((f)Q_{s-1w} + Q_e) - (f)(Q_{s-1w})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Wet } WLA_a = [6.95((.25)(.42)(34.9+1.25) - (\ )(\ )(\ )] / (1.25) \text{ mg/l}$$
$$\text{Wet } WLA_a = 24.8 \text{ mg/l}$$

Chronic:

$$\text{Dry } WLA_c = [CC_{dry}((f)Q_{s-30} + Q_e) - (f)(Q_{s-30})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Dry } WLA_c = [1.29((.25)(\ )(37.2+1.25) - (\ )(\ )(\ )] / (1.25) \text{ mg/l}$$
$$\text{Dry } WLA_c = 9.9 \text{ mg/l}$$

$$\text{Wet } WLA_c = [CC_{wet}((f)Q_{s-30w} + Q_e) - (f)(Q_{s-30w})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Wet } WLA_c = [2.10((.25)(\ )(58+1.25) - (\ )(\ )(\ )] / (1.25) \text{ mg/l}$$
$$\text{Wet } WLA_c = 24.9 \text{ mg/l}$$

Mixing Zone Predictions for Ft. Chiswell WWTP

Effluent Flow = 1.25 MGD
Stream 7Q10 = 32.3 MGD
Stream 30Q10 = 37.2 MGD
Stream 1Q10 = 26.5 MGD
Stream slope = 0.001246 ft/ft
Stream width = 75 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.2655 ft
Length = 4317.29 ft
Velocity = .5472 ft/sec
Residence Time = .0913 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.3749 ft
Length = 4021.64 ft
Velocity = .5772 ft/sec
Residence Time = .0806 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.1277 ft
Length = 4764.07 ft
Velocity = .5079 ft/sec
Residence Time = 2.6056 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 38.38% of the 1Q10 is used.

Mixing Zone Predictions for Ft. Chiswell WWTP-Wet

Effluent Flow = 1.25 MGD
Stream 7Q10 = 44.0 MGD
Stream 30Q10 = 58 MGD
Stream 1Q10 = 34.9 MGD
Stream slope = 0.001246 ft/ft
Stream width = 75 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.5183 ft
Length = 3693.53 ft
Velocity = .6151 ft/sec
Residence Time = .0695 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.7898 ft
Length = 3205.39 ft
Velocity = .6833 ft/sec
Residence Time = .0543 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.3243 ft
Length = 4152.92 ft
Velocity = .5634 ft/sec
Residence Time = 2.0475 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 48.84% of the 1Q10 is used.

9/16/2011 1:36:00 PM

Facility = Ft Chiswell WWTP, Dry, 1.25 MGD
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 14.7
WLAc = 9.9
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 15
Variance = 81
C.V. = 0.6
97th percentile daily values = 36.5012
97th percentile 4 day average = 24.9568
97th percentile 30 day average= 18.0907
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 14.7
Average Weekly limit = 10.7522223888485 ≈ 11 mg/l
Average Monthly Limit = 8.00900031447701 ≈ 8.0 mg/l } use as year-round limits

The data are:

15

9/16/2011 1:37:52 PM

Facility = Ft Chiswell WWTP, Wet, 1.25 MGD
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 24.6
WLAc = 24.9
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 15
Variance = 81
C.V. = 0.6
97th percentile daily values = 36.5012
97th percentile 4 day average = 24.9568
97th percentile 30 day average= 18.0907
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 24.6
Average Weekly limit = 17.9935150180731 ≈ 18 mg/l
Average Monthly Limit = 13.4028168527983 ≈ 13 mg/l

The data are:

15

Calculation of Total Ammonia Nitrogen Limits

Facility Name: Ft. Chiswell WWTP
VPDES Permit No: VA0074161
Stream Name: Reed Creek
Stream Tier Designation: II

NH_3-N limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human Health standards are not applicable for ammonia.

The following stream parameter values are being used for the calculations. The dry season is June - December and the wet season is January - May.

Dry Season pH = 8.1
Wet Season pH = 8.1
Dry Season Temperature (deg.C) = 22
Wet Season Temperature (deg.C) = 12

The ammonia nitrogen water quality standards (WQS) are:

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Chronic: CC_{dry} = 1.29 CC_{wet} = 2.10

The following flows apply:

Q_e = Design Flow of STP (MGD) = 1.5
Q_{s-1} = 1Q10 Flow (MGD) = 26.5
Q_{s-1w} = 1Q10 High Flow (MGD) = 34.9
Q_{s-30} = 30Q10 Flow (MGD) = 37.2
Q_{s-30w} = 30Q10 High Flow (MGD) = 58

The water quality wasteload allocations (WLAs) are calculated as follows:

f = fraction of stream flow to use from MIX Program

Acute:

$$\text{Dry } WLA_a = [AC_{dry}((f)Q_{s-1} + Q_e) - (f)(Q_{s-1})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Dry } WLA_a = [6.95((.25)(.39)(26.5+1.5) - (\ )(\ )(\ )] / (1.5) \text{ mg/l}$$
$$\text{Dry } WLA_a = 12.6 \text{ mg/l}$$

$$\text{Wet } WLA_a = [AC_{wet}((f)Q_{s-1w} + Q_e) - (f)(Q_{s-1w})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Wet } WLA_a = [6.95((.25)(.49)(34.9+1.5) - (\ )(\ )(\ )] / (1.5) \text{ mg/l}$$
$$\text{Wet } WLA_a = 20.6 \text{ mg/l}$$

Chronic:

$$\text{Dry } WLA_c = [CC_{dry}((f)Q_{s-30} + Q_e) - (f)(Q_{s-30})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Dry } WLA_c = [1.29((.25)(\ )(37.2+1.5) - (\ )(\ )(\ )] / (1.5) \text{ mg/l}$$
$$\text{Dry } WLA_c = 8.3 \text{ mg/l}$$

$$\text{Wet } WLA_c = [CC_{wet}((f)Q_{s-30w} + Q_e) - (f)(Q_{s-30w})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Wet } WLA_c = [2.10((.25)(\ )(58+1.5) - (\ )(\ )(\ )] / (1.5) \text{ mg/l}$$
$$\text{Wet } WLA_c = 20.8 \text{ mg/l}$$

Mixing Zone Predictions for Ft. Chiswell WWTP

Effluent Flow = 1.5 MGD
Stream 7Q10 = 32.3 MGD
Stream 30Q10 = 37.2 MGD
Stream 1Q10 = 26.5 MGD
Stream slope = 0.001246 ft/ft
Stream width = 75 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.2713 ft
Length = 4300.66 ft
Velocity = .5488 ft/sec
Residence Time = .0907 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.3804 ft
Length = 4007.91 ft
Velocity = .5787 ft/sec
Residence Time = .0802 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.1339 ft
Length = 4742.04 ft
Velocity = .5097 ft/sec
Residence Time = 2.5844 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 38.69% of the 1Q10 is used.

Mixing Zone Predictions for Ft. Chiswell WWTP-Wet

Effluent Flow = 1.5 MGD
Stream 7Q10 = 44.0 MGD
Stream 30Q10 = 58 MGD
Stream 1Q10 = 34.9 MGD
Stream slope = 0.001246 ft/ft
Stream width = 75 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.5234 ft
Length = 3682.76 ft
Velocity = .6165 ft/sec
Residence Time = .0691 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.7944 ft
Length = 3198.28 ft
Velocity = .6844 ft/sec
Residence Time = .0541 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.3298 ft
Length = 4138.13 ft
Velocity = .5649 ft/sec
Residence Time = 2.0347 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 49.15% of the 1Q10 is used.

9/16/2011 1:50:06 PM

Facility = Ft Chiswell WWTP, 1.5 MGD, Dry
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 12.6
WLAc = 8.3
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 15
Variance = 81
C.V. = 0.6
97th percentile daily values = 36.5012
97th percentile 4 day average = 24.9568
97th percentile 30 day average= 18.0907
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 12.6
Average Weekly limit = 9.21619061901303 ≈ 9.2 mg/l
Average Monthly Limit = 6.86485741240887 ≈ 6.9 mg/l } Use as year round limits

The data are:

15

9/16/2011 1:46:27 PM

Facility = Ft Chiswell WWTP, 1.5 MGD, Wet
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 20.6
WLAc = 20.8
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 15
Variance = 81
C.V. = 0.6
97th percentile daily values = 36.5012
97th percentile 4 day average = 24.9568
97th percentile 30 day average= 18.0907
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 20.6
Average Weekly limit = 15.0677402183864 ≈ 15. mg/l
Average Monthly Limit = 11.2234970393351 ≈ 11 mg/l

The data are:

15

Calculation of Total Ammonia Nitrogen Limits

Facility Name: Ft. Chiswell WWTP
VPDES Permit No: VA0074161
Stream Name: Reed Creek
Stream Tier Designation: II

NH_3-N limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human Health standards are not applicable for ammonia.

The following stream parameter values are being used for the calculations. The dry season is June - December and the wet season is January - May.

Dry Season pH = 8.1 | Dry Season Temperature (deg.C) = 22
Wet Season pH = 8.1 | Wet Season Temperature (deg.C) = 12

The ammonia nitrogen water quality standards (WQS) are:

Acute: AC_{dry} = 6.95 AC_{wet} = 6.95

Chronic: CC_{dry} = 1.29 CC_{wet} = 2.10

The following flows apply:

Q_e = Design Flow of STP(MGD) = 2.0
Q_{s-1} = 1Q10 Flow (MGD) = 26.5
Q_{s-1w} = 1Q10 High Flow (MGD) = 34.9
Q_{s-30} = 30Q10 Flow (MGD) = 37.2
Q_{s-30w} = 30Q10 High Flow (MGD) = 58

The water quality wasteload allocations (WLAs) are calculated as follows:

f = fraction of stream flow to use from MIX Program

Acute:

$$\text{Dry } WLA_a = [AC_{dry}((f)Q_{s-1} + Q_e) - (f)(Q_{s-1})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Dry } WLA_a = [6.95((.25)(.39)(26.5+2.0) - ( )( )( )] / (2.0) \text{ mg/l}$$
$$\text{Dry } WLA_a = 9.6 \text{ mg/l}$$

$$\text{Wet } WLA_a = [AC_{wet}((f)Q_{s-1w} + Q_e) - (f)(Q_{s-1w})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Wet } WLA_a = [6.95((.25)(.50)(34.9+2.0) - ( )( )( )] / (2.0) \text{ mg/l}$$
$$\text{Wet } WLA_a = 16.0 \text{ mg/l}$$

Chronic:

$$\text{Dry } WLA_c = [CC_{dry}((f)Q_{s-30} + Q_e) - (f)(Q_{s-30})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Dry } WLA_c = [1.29((.25)( )(37.2+2.0) - ( )( )( )] / (2.0) \text{ mg/l}$$
$$\text{Dry } WLA_c = 6.3 \text{ mg/l}$$

$$\text{Wet } WLA_c = [CC_{wet}((f)Q_{s-30w} + Q_e) - (f)(Q_{s-30w})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Wet } WLA_c = [2.10((.25)( )(58+2.0) - ( )( )( )] / (2.0) \text{ mg/l}$$
$$\text{Wet } WLA_c = 15.8 \text{ mg/l}$$

Mixing Zone Predictions for Ft. Chiswell WWTP

Effluent Flow = 2.0 MGD
Stream 7Q10 = 32.3 MGD
Stream 30Q10 = 37.2 MGD
Stream 1Q10 = 26.5 MGD
Stream slope = 0.001246 ft/ft
Stream width = 75 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.2826 ft
Length = 4268.03 ft
Velocity = .5519 ft/sec
Residence Time = .0895 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.3912 ft
Length = 3981.21 ft
Velocity = .5816 ft/sec
Residence Time = .0792 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.1461 ft
Length = 4698.9 ft
Velocity = .5132 ft/sec
Residence Time = 2.5431 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 39.32% of the 1Q10 is used.

Mixing Zone Predictions for Ft. Chiswell WWTP-Wet

Effluent Flow = 2.0 MGD
Stream 7Q10 = 44.0 MGD
Stream 30Q10 = 58 MGD
Stream 1Q10 = 34.9 MGD
Stream slope = 0.001246 ft/ft
Stream width = 75 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.5336 ft
Length = 3661.78 ft
Velocity = .6191 ft/sec
Residence Time = .0685 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.8036 ft
Length = 3184.25 ft
Velocity = .6866 ft/sec
Residence Time = .0537 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.3409 ft
Length = 4108.67 ft
Velocity = .568 ft/sec
Residence Time = 2.0095 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 49.76% of the 1Q10 is used.

Virginia DEQ Mixing Zone Analysis Version 2.1

9/16/2011 1:52:31 PM

Facility = Ft Chiswell WWTP, 2.0 MGD, Dry
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 9.6
WLAc = 6.3
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 15
Variance = 81
C.V. = 0.6
97th percentile daily values = 36.5012
97th percentile 4 day average = 24.9568
97th percentile 30 day average= 18.0907
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 9.6
Average Weekly limit = 7.02185951924802 ≈ 7.0 mg/l
Average Monthly Limit = 5.23036755231152 ≈ 5.2 mg/l } use as year round limits

The data are:

15

9/16/2011 2:00:05 PM

Facility = Ft CHiswell WWTP, 2.0 MGD Wet
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 16
WLAc = 15.8
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 15
Variance = 81
C.V. = 0.6
97th percentile daily values = 36.5012
97th percentile 4 day average = 24.9568
97th percentile 30 day average= 18.0907
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 16
Average Weekly limit = 11.7030991987467 ≈ 12 mg/l
Average Monthly Limit = 8.71727925385253 ≈ 8.7 mg/l

The data are:

15

Calculation of Total Ammonia Nitrogen Limits

Facility Name: Ft. Chiswell WWTP
VPDES Permit No: VA0074161
Stream Name: Reed Creek
Stream Tier Designation: II

NH_3-N limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human Health standards are not applicable for ammonia.

The following stream parameter values are being used for the calculations. The dry season is June - December and the wet season is January - May.

Dry Season pH = 8.1 Dry Season Temperature (deg.C) = 22
Wet Season pH = 8.1 Wet Season Temperature (deg.C) = 12

The ammonia nitrogen water quality standards (WQS) are:

Acute: AC_{dry} = 6.95 AC_{wet} = 6.95

Chronic: CC_{dry} = 1.29 CC_{wet} = 2.10

The following flows apply:

Q_e = Design Flow of STP(MGD) = 2.5
Q_{s-1} = 1Q10 Flow (MGD) = 26.5
Q_{s-1w} = 1Q10 High Flow (MGD) = 34.9
Q_{s-30} = 30Q10 Flow (MGD) = 37.2
Q_{s-30w} = 30Q10 High Flow (MGD) = 58

The water quality wasteload allocations (WLAs) are calculated as follows:

f = fraction of stream flow to use from MIX Program

Acute:

$$\text{Dry } WLA_a = [AC_{dry}((f)Q_{s-1} + Q_e) - (f)(Q_{s-1})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Dry } WLA_a = [6.95((.25)(.46)(26.5+2.5) - ( )( )( )] / (2.5) \text{ mg/l}$$
$$\text{Dry } WLA_a = 8.0 \text{ mg/l}$$

$$\text{Wet } WLA_a = [AC_{wet}((f)Q_{s-1w} + Q_e) - (f)(Q_{s-1w})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Wet } WLA_a = [6.95((.25)(.50)(34.9+2.5) - ( )( )( )] / (2.5) \text{ mg/l}$$
$$\text{Wet } WLA_a = 13 \text{ mg/l}$$

Chronic:

$$\text{Dry } WLA_c = [CC_{dry}((f)Q_{s-30} + Q_e) - (f)(Q_{s-30})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Dry } WLA_c = [1.29((.25)( )(37.2+2.5) - ( )( )( )] / (2.5) \text{ mg/l}$$
$$\text{Dry } WLA_c = 5.1 \text{ mg/l}$$

$$\text{Wet } WLA_c = [CC_{wet}((f)Q_{s-30w} + Q_e) - (f)(Q_{s-30w})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Wet } WLA_c = [2.10((.25)( )(58+2.5) - ( )( )( )] / (2.5) \text{ mg/l}$$
$$\text{Wet } WLA_c = 12.7 \text{ mg/l}$$

Mixing Zone Predictions for Ft. Chiswell WWTP

Effluent Flow = 2.5 MGD
Stream 7Q10 = 32.3 MGD
Stream 30Q10 = 37.2 MGD
Stream 1Q10 = 26.5 MGD
Stream slope = 0.001246 ft/ft
Stream width = 75 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.294 ft
Length = 4235.95 ft
Velocity = .5551 ft/sec
Residence Time = .0883 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.402 ft
Length = 3954.92 ft
Velocity = .5845 ft/sec
Residence Time = .0783 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.1583 ft
Length = 4656.52 ft
Velocity = .5168 ft/sec
Residence Time = 2.5031 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 39.95% of the 1Q10 is used.

Mixing Zone Predictions for Ft. Chiswell WWTP-Wet

Effluent Flow = 2.5 MGD
Stream 7Q10 = 44.0 MGD
Stream 30Q10 = 58 MGD
Stream 1Q10 = 34.9 MGD
Stream slope = 0.001246 ft/ft
Stream width = 75 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.5437 ft
Length = 3641.31 ft
Velocity = .6217 ft/sec
Residence Time = .0678 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.8127 ft
Length = 3170.42 ft
Velocity = .6888 ft/sec
Residence Time = .0533 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.3519 ft
Length = 4080.11 ft
Velocity = .571 ft/sec
Residence Time = 1.985 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 50.38% of the 1Q10 is used.

9/16/2011 2:02:11 PM

Facility = Ft Chiswell WWTP, 2.5 MGD, Dry
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 8.1
WLAc = 5.1
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 15
Variance = 81
C.V. = 0.6
97th percentile daily values = 36.5012
97th percentile 4 day average = 24.9568
97th percentile 30 day average= 18.0907
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 8.1
Average Weekly limit = 5.92469396936552 ≈ 5.9 mg/l
Average Monthly Limit = 4.41312262226284 ≈ 4.4 mg/l

The data are:

15

9/16/2011 2:02:42 PM

Facility = Ft Chiswell WWTP, 2.5 MGD, Wet
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 13
WLAc = 12.7
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 15
Variance = 81
C.V. = 0.6
97th percentile daily values = 36.5012
97th percentile 4 day average = 24.9568
97th percentile 30 day average= 18.0907
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 13
Average Weekly limit = 9.5087680989817 % 9.5 mg/l
Average Monthly LImit = 7.08278939375518 % 7.1 mg/l

The data are:

15

Calculation of Total Residual Chlorine

Facility Name: Ft. Chiswell WWTP

Assumimg a background value of 0 and Tier II Waters:

For 1.25 MGD Facility

ACUTE

$$WQ\text{-}WLA = \frac{(0.25)Ao_d\ (Qs\text{-}1_{dry} + Qe)}{Qe}$$

$$WQ\text{-}WLA_{ad} = (0.25)(0.019)(0.38)(26.5 + 1.25)/1.25 = 0.040 \text{ mg/l}$$

CHRONIC

$$AWLA_{cd} = \frac{(0.25)Co_d(Qs\text{-}7_{dry} + Qe)]}{Qe}$$

$$AWLA_{cd} = (0.25)(0.011)(32.3 + 1.25/1.25 = 0.074 \text{ mg/l}$$

For 1.5 MGD Facility

ACUTE

$$WQ\text{-}WLA = \frac{(0.25)Ao_d\ (Qs\text{-}1_{dry} + Qe)}{Qe}$$

$$WQ\text{-}WLA_{ad} = (0.25)(0.019)(0.39)(26.5 + 1.5)/1.5 = 0.035 \text{ mg/l}$$

CHRONIC

$$AWLA_{cd} = \frac{(0.25)Co_d(Qs\text{-}7_{dry} + Qe)]}{Qe}$$

$$AWLA_{cd} = (0.25)(0.011)(32.3 + 1.5)/1.5 = 0.06 \text{ mg/l}$$

For 2.0 MGD Facility

ACUTE

$$WQ\text{-}WLA = \frac{(0.25)Ao_d\ (Qs\text{-}1_{dry} + Qe)}{Qe}$$

$$WQ\text{-}WLA_{ad} = (0.25)(0.019)(0.50)(26.5 + 2.0)/2.0 = 0.034 \text{ mg/l}$$

Calculation of Total Residual Chlorine

Facility Name: Ft. Chiswell WWTP

CHRONIC

$$AWLA_{cd} = \frac{(0.25)Co_d(Qs\text{-}7_{dry} + Qe)]}{Qe}$$

$AWLA_{cd} = (0.25)(0.011)(32.3 + 2.0)/2.0 = 0.047$ mg/l

For 2.5 MGD Facility

ACUTE

$$WQ\text{-}WLA = \frac{(0.25)Ao_d\ (Qs\text{-}1_{dry} + Qe)}{Qe}$$

$WQ\text{-}WLA_{ad} = (0.25)(0.019)(0.50)(26.5 + 2.5)/2.5 = 0.028$ mg/l

CHRONIC

$$AWLA_{cd} = \frac{(0.25)Co_d(Qs\text{-}7_{dry} + Qe)]}{Qe}$$

$AWLA_{cd} = (0.25)(0.011)(32.3 + 2.5)/2.5 = 0.038$ mg/l

9/9/2011 9:08:30 AM

Facility = Ft Chiswell WWTP - 1.25 MGD
Chemical = Total Residual Chlorine
Chronic averaging period = 4
WLAa = 0.04
WLAc = 0.074
Q.L. = 0.1
# samples/mo. = 112
# samples/wk. = 28

Summary of Statistics:

observations = 1
Expected Value = 1
Variance = .36
C.V. = 0.6
97th percentile daily values = 2.43341
97th percentile 4 day average = 1.66379
97th percentile 30 day average= 1.20605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 0.04
Average Weekly limit = 2.02023659857805E-02 ≈ 0.020 mg/l
Average Monthly Limit = 1.81907570647663E-02 ≈ 0.018 mg/l

The data are:

1

9/9/2011 9:09:52 AM

Facility = Ft Chiswell WWTP - 1.5 MGD
Chemical = Total Residual Chlorine
Chronic averaging period = 4
WLAa = 0.035
WLAc = 0.06
Q.L. = 0.1
# samples/mo. = 112
# samples/wk. = 28

Summary of Statistics:

observations = 1
Expected Value = 1
Variance = .36
C.V. = 0.6
97th percentile daily values = 2.43341
97th percentile 4 day average = 1.66379
97th percentile 30 day average= 1.20605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 0.035
Average Weekly limit = 1.76770702375579E-02 ≈ 0.018 mg/l
Average Monthly LImit = 1.59169124316705E-02 ≈ 0.016 mg/l

The data are:

1

9/9/2011 9:11:10 AM

Facility = Ft Chiswell WWTP - 2.0 MGD
Chemical = Total Residual Chlorine
Chronic averaging period = 4
WLAa = 0.034
WLAc = 0.047
Q.L. = 0.1
# samples/mo. = 112
# samples/wk. = 28

Summary of Statistics:

observations = 1
Expected Value = 1
Variance = .36
C.V. = 0.6
97th percentile daily values = 2.43341
97th percentile 4 day average = 1.66379
97th percentile 30 day average= 1.20605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 0.034
Average Weekly limit = 1.71720110879134E-02 ≈ 0.017 mg/l
Average Monthly Limit = 1.54621435050514E-02 ≈ 0.015 mg/l

The data are:

1

9/9/2011 9:01:06 AM

Facility = Ft Chiswell WWTP - 2.5 MGD
Chemical = Total Residual Chlorine
Chronic averaging period = 30
WLAa = 0.028
WLAc = 0.038
Q.L. = 0.1
# samples/mo. = 336
# samples/wk. = 84

Summary of Statistics:

observations = 1
Expected Value = 1
Variance = .36
C.V. = 0.6
97th percentile daily values = 2.43341
97th percentile 4 day average = 1.66379
97th percentile 30 day average= 1.20605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 0.028
Average Weekly limit = 1.29847851397461E-02 ≈ 0.013 mg/l
Average Monthly Limit = 1.22149054429514E-02 ≈ 0.012 mg/l

The data are:

1

"Model Run For C:\Users\jjc93887\Documents\FREDWORK\Ft. Chiswell Model.mod On 7/6/2016 3:10:53 PM"

"Model is for REED CREEK."
"Model starts at the FT. CHISWELL WWTP discharge."

"Background Data"

"7Q10"	"cBOD5"	"TKN"	"DO"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
32.2615,	2,	0,	7.347,	22

"Discharge/Tributary Input Data for Segment 1"

"Flow"	"cBOD5"	"TKN"	"DO"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
2.5,	~~24,~~ 30 BOD5	7.4, 4.4 NH3-N	,6,	25

"Hydraulic Information for Segment 1"

"Length"	"Width"	"Depth"	"Velocity"
"(mi)"	"(ft)"	"(ft)"	"(ft/sec)"
2.9,	94.999,	1.12,	.505

"Initial Mix Values for Segment 1"

"Flow"	"DO"	"cBOD"	"nBOD"	"DOSat"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
34.7615,	7.25,	8.956,	1.37,	8.135,	22.21576

"Rate Constants for Segment 1. - (All units Per Day)"

"k1"	"k1@T"	"k2"	"k2@T"	"kn"	"kn@T"	"BD"	"BD@T"
.3,	.332,	3.931,	4.143,	.15,	.178,	0,	0

"Output for Segment 1"
"Segment starts at FT. CHISWELL WWTP"

"Total Dist."	"Segm. Dist."	"DO"	"cBOD"	"nBOD"
"(mi)"	"(mi)"	"(mg/l)"	"(mg/l)"	"(mg/l)"
0,	0,	7.25,	8.956,	1.37
.1,	.1,	7.255,	8.92,	1.367
.2,	.2,	7.26,	8.884,	1.364
.3,	.3,	7.265,	8.848,	1.361
.4,	.4,	7.27,	8.813,	1.358
.5,	.5,	7.275,	8.778,	1.355
.6,	.6,	7.28,	8.743,	1.352
.7,	.7,	7.285,	8.708,	1.349
.8,	.8,	7.29,	8.673,	1.346
.9,	.9,	7.295,	8.638,	1.343
1,	1,	7.299,	8.603,	1.34
1.1,	1.1,	7.303,	8.568,	1.337
1.2,	1.2,	7.307,	8.534,	1.334
1.3,	1.3,	7.311,	8.5,	1.331
1.4,	1.4,	7.315,	8.466,	1.328
1.5,	1.5,	7.319,	8.432,	1.325
1.6,	1.6,	7.322,	8.398,	1.322
1.7,	1.7,	7.322,	8.364,	1.319
1.8,	1.8,	7.322,	8.33,	1.316
1.9,	1.9,	7.322,	8.297,	1.313
2,	2,	7.322,	8.264,	1.31
2.1,	2.1,	7.322,	8.231,	1.307
2.2,	2.2,	7.322,	8.198,	1.304
2.3,	2.3,	7.322,	8.165,	1.301
2.4,	2.4,	7.322,	8.132,	1.298
2.5,	2.5,	7.322,	8.099,	1.295
2.6,	2.6,	7.322,	8.067,	1.292
2.7,	2.7,	7.322,	8.035,	1.289

```
2.8,      2.8,      7.322,    8.003,    1.286
2.9,      2.9,      7.322,    7.971,    1.283


"END OF FILE"
```

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to REED CREEK.

File Information

File Name:	C:\Users\jjc93887\Documents\FREDWORK\Ft. Chiswell Model.mod
Date Modified:	July 06, 2016

Water Quality Standards Information

Stream Name:	REED CREEK
River Basin:	New River Basin
Section:	2
Class:	IV - Mountainous Zones Waters
Special Standards:	v

Background Flow Information

Gauge Used:	Reed Creek at Grahams Forge
Gauge Drainage Area:	247 Sq.Mi.
Gauge 7Q10 Flow:	34.2 MGD
Headwater Drainage Area:	233 Sq.Mi.
Headwater 7Q10 Flow:	32.26154 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	0 MGD
Incremental Flow in Segments:	0.1384615 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	22 Degrees C
Background cBOD5:	2 mg/l
Background TKN:	0 mg/l
Background D.O.:	7.346845 mg/l

Model Segmentation

Number of Segments:	1
Model Start Elevation:	1979 ft above MSL
Model End Elevation:	1960 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to REED CREEK.

Segment Information for Segment 1

Definition Information

Segment Definition:	A discharge enters.
Discharge Name:	FT. CHISWELL WWTP
VPDES Permit No.:	

Discharger Flow Information

Flow:	2.5 MGD
cBOD5:	24 mg/l
TKN:	7.4 mg/l
D.O.:	6 mg/l
Temperature:	25 Degrees C

Geographic Information

Segment Length:	2.9 miles
Upstream Drainage Area:	233 Sq.Mi.
Downstream Drainage Area:	0 Sq.Mi.
Upstream Elevation:	1979 Ft.
Downstream Elevation:	1960 Ft.

Hydraulic Information

Segment Width:	94.999 Ft.
Segment Depth:	1.12 Ft.
Segment Velocity:	0.505 Ft./Sec.
Segment Flow:	34.762 MGD
Incremental Flow:	-32.262 MGD (Applied at end of segment.)

Channel Information

Cross Section:	Rectangular
Character:	Mostly Straight
Pool and Riffle:	Yes
Percent Pools:	50
Percent Riffles:	50
Pool Depth:	1.5 Ft.
Riffle Depth:	0.75 Ft.
Bottom Type:	Small Rock
Sludge:	None
Plants:	None
Algae:	None

ATTACHMENT 4

Metals Specific Target Values for Water Quality Criteria Monitoring

		HARDNESS	200.00
ACUTE	COPPER ug/l	WQSACUTE	25.8
CHRONIC		WQSCHRONIC	16.2
		HARDNESS	200.00
ACUTE	LEAD ug/l	WQSACUTE	287.37
CHRONIC		WQSCHRONIC	32.65
		HARDNESS	200.00
ACUTE	ZINC ug/l	WQSACUTE	215.57
CHRONIC		WQSCHRONIC	215.57
		HARDNESS	200.00
ACUTE	CADMIUM ug/l	WQSACUTE	8.57
CHRONIC		WQSCHRONIC	1.95
		HARDNESS	200.00
ACUTE	CHROMIUM III ug/l	WQSACUTE	1005.17
CHRONIC		WQSCHRONIC	130.75
		HARDNESS	200.00
ACUTE	NICKEL ug/l	WQSACUTE	327.79
CHRONIC		WQSCHRONIC	36.43
		HARDNESS	200.00
ACUTE	SIVER ug/l	WQSACUTE	11.37

Date	Station	TempC	pH	HARDNESS, TOTAL (MG/L AS CACO3)
14/06/2016	9-RDC009.00	19.48	8.30	187
13/04/2016	9-RDC009.00	15.33	8.90	174
11/02/2016	9-RDC009.00	1.81	8.16	191
02/12/2015	9-RDC009.00	10.71	7.76	100
06/10/2015	9-RDC009.00	14.78	8.19	173
04/08/2015	9-RDC009.00	23.84	8.68	182
01/06/2015	9-RDC009.00	21.07	8.31	191
01/04/2015	9-RDC009.00	11.27	8.44	176
05/02/2015	9-RDC009.00	3.47	8.66	150
24/06/2003	9-RDC009.00	18.90	8.18	170
15/05/2003	9-RDC009.00	17.40	8.41	172
24/04/2003	9-RDC009.00	12.11	8.45	141
12/03/2003	9-RDC009.00	9.01	8.23	147
27/02/2003	9-RDC009.00	4.32	7.44	148
21/01/2003	9-RDC009.00	2.20	8.34	175
10/12/2002	9-RDC009.00	3.53	8.50	163
14/11/2002	9-RDC009.00	9.24	7.80	108
16/10/2002	9-RDC009.00	13.20	8.32	175
03/09/2002	9-RDC009.00	21.90	8.30	136
21/08/2002	9-RDC009.00	22.69	8.39	145
29/07/2002	9-RDC009.00	28.05	8.42	56
10/06/2002	9-RDC009.00	24.00	8.50	172
09/05/2002	9-RDC009.00	20.00	8.21	129
25/04/2002	9-RDC009.00	16.30	8.44	146
18/03/2002	9-RDC009.00	7.83	7.54	76
06/02/2002	9-RDC009.00	3.56	8.38	170
15/01/2002	9-RDC009.00	5.17	8.77	167
20/12/2001	9-RDC009.00	6.29	8.31	169
06/11/2001	9-RDC009.00	9.85	8.94	160
02/10/2001	9-RDC009.00	15.80	8.54	174
17/09/2001	9-RDC009.00	16.70	8.45	156
02/08/2001	9-RDC009.00	18.70	7.85	171
12/07/2001	9-RDC009.00	21.30	8.20	183
01/03/2001	9-RDC009.00	6.91	8.34	93
18/01/2001	9-RDC009.00	4.32	7.99	166
20/11/2000	9-RDC009.00	4.06	8.34	166
25/09/2000	9-RDC009.00	20.00	7.90	170
19/07/2000	9-RDC009.00	22.00	8.20	153
17/05/2000	9-RDC009.00	17.80	8.03	166
20/03/2000	9-RDC009.00	7.70	8.11	127
27/01/2000	9-RDC009.00	.00	8.11	195
24/04/2002	9-RDC013.79	13.60	8.07	161
01/03/2001	9-RDC033.94	4.94	7.76	43
07/02/2001	9-RDC033.94	2.06	7.90	118
18/01/2001	9-RDC033.94	.92	7.91	149
13/12/2000	9-RDC033.94	.35	7.86	174
20/11/2000	9-RDC033.94	2.71	7.95	192
19/10/2000	9-RDC033.94	11.20	7.69	225
25/09/2000	9-RDC033.94	19.50	7.66	202

- 90th. percentile - use 200 mg/l

Fort Chiswell WWTP
Metals Calculations

WLA formula = chronic standard (7Q10 + effluent flow) / effluent flow

Antimony: WLA = 640 (32.3 + 1.25) / 1.25 = ~~17,178~~ 1000 ug/l

Arsenic: WLA = 150 (32.3 + 1.25) / 1.25 = ~~4026~~ 1000 ug/l

Cadmium: WLA = 1.95 (32.3 + 1.25) / 1.25 = ~~52.3~~ 50 ug/l

Chromium III: WLA = 130.75 (32.3 + 1.25) / 1.25 = ~~3509~~ 1000 ug/l

Chromium VI: WLA = 11 (32.3 + 1.25) / 1.25 = ~~295~~ 200 ug/l

Copper: WLA = 16.2 (32.3 + 1.25) / 1.25 = ~~435~~ 400 ug/l

Lead: WLA = 32.65 (32.3 + 1.25) / 1.25 = ~~876~~ 800 ug/l

Mercury: WLA = 0.77 (32.3 + 1.25) / 1.25 = .21 ug/l

Selenium: WLA = 5.0 (32.3 + 1.25) / 1.25 = ~~134~~ 100 ug/l

Silver: WLA = 11.37 (26.5 ← 1Q10 + 1.25) / 1.25 = ~~298~~ 200 ug/l

Zinc: WLA = 215.57 (32.3 + 1.25) / 1.25 = ~~5786~~ 1000 ug/l

Nickel: WLA = 36.43 (32.3 + 1.25) / 1.25 = ~~978~~ 900 ug/l

ATTACHMENT 5

Whole Effluent Toxicity Analysis

Table 1.
WET Summary Test Results
Ft. Chiswell WWTP
VPDES Permit No. VA0029564
11/28/2011 –11/27/2016, Report Due by October 10th each year

NOEC Screening Criteria is 4% or TU_c of 25

TEST DATE		TEST TYPE/ORGANISM	LC_{50}	NOEC	% Survival in 100% conc.	NOTES	Lab
02/19/13 - 02/26/13 Received 03/25/2013	AN-1	Chronic P. promelas	NA	100% S 100% G	95%	Pass	REI Consultants, Inc.
02/19/13 - 02/26/13 Received 07/18/2013		Chronic C. dubia	NA	100% S 100% R	80%	Pass	REI Consultants, Inc.
09/10/13 - 09/17/13 Received 10/28/2013	AN-2	Chronic P. promelas	NA	100% S 100% G	100%	Pass	CBI.
09/10/13- 09/16/13 Received 10/28/2013		Chronic C. dubia	NA	100% S 100% R	97.5%	Pass	CBI
08/20/14 - 08/22/14 Received 09/09/2014	AN-3	Chronic P. promelas	NA	100% S 100% G	97.5 %	Pass	CBI.
08/20/14- 08/25/14 Received 09/09/2014		Chronic C. dubia	NA	100% S 52.5 % R	100%	Pass	CBI
08/20/14 - 08/22/14 Received 09/17/2015	AN-4	Chronic P. promelas	NA	100% S 100% G	97.5 %	Pass	CBI.
08/20/14- 08/25/14 Received 09/17/2015		Chronic C. dubia	NA	100% S 52.5 % R	90%	Pass	CBI

%Survival is the percent survival in 100% effluent at the end of the test period.
All samples are 24 hour flow proportional composites.

ABBREVIATIONS:
AN = Annual tests
R = Reproduction
G = Growth
S = Survival

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIXEXE required also)

Enter data in the cells with blue type:

Entry Date:	09/21/11
Facility Name:	Ft Chiswell WWTP
VPDES Number:	VA0074161
Outfall Number:	1
Plant Flow:	1.25 MGD
Acute 1Q10:	26.5 MGD
Chronic 7Q10:	32.3 MGD
Are data available to calculate CV? (Y/N)	N
Are data available to calculate ACR? (Y/N)	N

Acute Endpoint/Permit Limit

ACUTE 3.28920008 TUa

ACUTE WLAa 3.2892

Chronic Endpoint/Permit Limit

CHRONIC 32.8920008 TU_c

BOTH* 32.8920008 TU_c

AML 32.8920008 TU_c

ACUTE WLAa,c 32.892

CHRONIC WLAc 26.84

* Both means acute expressed as chronic

% Flow to be used from MIX.EXE

47 %

100 %

(Minimum of 10 data points, same species, needed)

(NOEC<LC50, do not use greater/less than data)

Use as LC_{25} in Special Condition, as TUa on DMR

LC_{25} = 31 % Use as 3.22 TUa

Note: Inform the permittee that if the mean of the data exceeds this TUa: 1.0 a limit may result using WLA.EXE

Use as NOEC in Special Condition, as TUc on DMR

CHRONIC NOEC = 4 % Use as 25.00 TU_c

BOTH* NOEC = 4 % Use as 25.00 TU_c

AML NOEC = 4 % Use as 25.00 TU_c

Note: Inform the permittee that if the mean of the data exceeds this TUc: 13.5167924 a limit may result using WLA.EXE

Diffuser (modeling study?

Enter Y/N N

Acute 1 :1

Chronic 1 :1

Go to Page 2

Go to Page 3

IWC_a	9.120758847 %	Plant flow/plant flow + 1Q10
IWC_c	3.725782414 %	Plant flow/plant flow + 7Q10
Dilution, acute	10.964	100/IWCa
Dilution, chronic	26.84	100/IWCc
WLA_a	3.2892	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	26.84	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	32.892	ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation	0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants eA	0.4109447	Default = 0.41
eB	0.6010373	Default = 0.60
eC	2.4334175	Default = 2.43
eD	2.4334175	Default = 2.43 (1 samp) No. of sample: 1

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

**The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.

$LTA_{a,c}$	13.51679307	WLAa,c X's eA				
LTA_c	16.13184113	WLAc X's eB				
MDL** with $LTA_{a,c}$	32.89200081	TU_c	NOEC =	3.040253	(Protects from acute/chronic toxicity)	
MDL** with LTA_c	39.25550452	TU_c	NOEC =	2.547413	(Protects from chronic toxicity)	
AML with lowest LTA	32.89200081	TU_c	NOEC =	3.040253	Lowest LTA X's eD	

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

MDL with $LTA_{a,c}$	3.289200081	TU_a	LC50 =	30.402529	%
MDL with LTA_c	3.925550452	TU_a	LC50 =	25.474134	%

Rounded NOEC's %

NOEC = 4 %

NOEC = 3 %

NOEC = 4

Rounded LC50's %

LC50 = 31 %

LC50 = 26

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring		Limit	
	% Effluent	TUc	% Effluent	TUc
Dilution series based on data mean	7.4	13.51879		
Dilution series to use for limit			4	25
Dilution factor to recommend:	0.2719964		0.2	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	27.2	3.68	20.0	5.00
	7.4	13.52	4.0	25.00
	2.0	49.69	0.8	125.00
	0.55	182.70	0.2	625.00
Extra dilutions if needed	0.15	671.71	0.0	3125.00
	0.04	2469.57	0.0	15625.00

Table 3. Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50, enter it here: NO DATA %LC_{50}

NO DATA TUa

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA
(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88929666

eA = 0.410944686

Using the log variance to develop eB
(P. 100, step 2b of TSD)

δ_4^2 = 0.088177698

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC
(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD
(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296658

eD = 2.433417525

	Vertebrate IC_{25} Data or LC_{50} Data	LN of data	Invertebrate IC_{25} Data or LC_{50} Data	LN of data
1	0		0	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA
Mean	0	0	Mean	0
Variance	0	0.000000	Variance	0
CV	0		CV	0

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K16
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUs. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C138
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIX.EXE required also)

Enter data in the cells with blue type:

Entry Date:	09/21/11
Facility Name:	Ft Chiswell WWTP
VPDES Number:	VA0074161
Outfall Number:	1
Plant Flow:	1.5 MGD
Acute 1Q10:	26.5 MGD
Chronic 7Q10:	32.3 MGD
Are data available to calculate CV? (Y/N)	N (Minimum of 10 data points, same species, needed)
Are data available to calculate ACR? (Y/N)	N (NOEC<LC50, do not use greater/less than data)

Acute Endpoint/Permit Limit — Use as LC_{50} in Special Condition, as TU_a on DMR

ACUTE	2.79100007	TU_a	LC_{50} =	36	% Use as	2.77	TU_a
ACUTE WLAa	2.791		Note: Inform the permittee that if the mean of the data exceeds this TU_a:	1.0	a limit may result using WLA.EXE		

Chronic Endpoint/Permit Limit — Use as NOEC in Special Condition, as TU_c on DMR

CHRONIC	27.9100007	TU_c	NOEC =	4	% Use as	25.00	TU_c
BOTH*	27.9100007	TU_c	NOEC =	4	% Use as	25.00	TU_c
AML	27.9100007	TU_c	NOEC =	4	% Use as	25.00	TU_c

ACUTE WLAa,c	27.91	Note: Inform the permittee that if the mean of the data exceeds this TU_c:	11.469466
CHRONIC WLAc	22.5333333	a limit may result using WLA.EXE	

* Both means acute expressed as chronic

% Flow to be used from MIX.EXE: 47 % / 100 %

Diffuser /modeling study? Enter Y/N: N
Acute 1:1
Chronic 1:1

Go to Page 2
Go to Page 3

IWC_a	10.74883554 %	Plant flow/plant flow + 1Q10
IWC_c	4.437869822 %	Plant flow/plant flow + 7Q10

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

Dilution, acute	9.303333333	100/IWCa
Dilution, chronic	22.53333333	100/IWCc
WLA_a	2.791	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	22.53333333	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	27.91	ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation	0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants øA	0.4109447	Default = 0.41
øB	0.6010373	Default = 0.60
øC	2.4334175	Default = 2.43
øD	2.4334175	Default = 2.43 (1 samp) No. of sample: 1

**The Maximum Daily Limit is calculated from the lowest LTA, X's øC. The LTAa,c and MDL using it are driven by the ACR.

$LTA_{a,c}$	11.46946658	WLAa,c X's øA				
LTA_c	13.54337383	WLAc X's øB				
MDL** with $LTA_{a,c}$	27.91000068	TU_a	NOEC =	3.682945	(Protects from acute/chronic toxicity)	
MDL** with LTA_c	32.95668288	TU_c	NOEC =	3.034286	(Protects from chronic toxicity)	
AML with lowest LTA	27.91000068	TU_c	NOEC =	3.582945	Lowest LTA X's øD	

Rounded NOEC's		%
NOEC =	4	%
NOEC =	4	%
NOEC =	4	

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

MDL with $LTA_{a,c}$	2.791000068	TU_a	LC50 =	35.829451	%	
MDL with LTA_c	3.295668288	TU_a	LC50 =	30.342860	%	

Rounded LC50's		%
LC50 =	36	%
LC50 =	31	

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA

(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88929686

eA = 0.410944686

Using the log variance to develop eB

(P. 100, step 2b of TSD)

δ_4^2 = 0.068177898

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC

(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296858

eC = 2.433417525

Using the log variance to develop eD

(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296858

eD = 2.433417525

	Vertebrate IC_{25} Data or LC_{50} Data	LN of data	Invertebrate IC_{25} Data or LC_{50} Data	LN of data
	**********		**********	
1	0		0	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA
Mean	0	0	Mean	0
Variance	0	0.000000	Variance	0
CV	0		CV	0

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

DILUTION SERIES TO RECOMMEND

Table 4.	Monitoring		Limit	
	% Effluent	TUc	% Effluent	TUc
Dilution series based on data mean	8.7	11.46947		
Dilution series to use for limit			4	25
Dilution factor to recommend:	0.2952782		0.2	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	29.5	3.39	20.0	5.00
	8.7	11.47	4.0	25.00
	2.6	38.84	0.8	125.00
	0.76	131.55	0.2	625.00
Extra dilutions if needed	0.22	445.51	0.0	3125.00
	0.07	1508.79	0.0	15625.00

Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

ACR used: 10

Table 3.

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC_{50}, enter it here:

NO DATA	$\%LC_{50}$	
NO DATA	TUa	

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered. otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUa. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C135
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIX.EXE required also)

Enter data in the cells with blue type:

Entry Date:	09/21/11
Facility Name:	Ft Chiswell WWTP
VPDES Number:	VA0074161
Outfall Number:	1
Plant Flow:	2 MGD
Acute 1Q10:	26.6 MGD
Chronic 7Q10:	32.3 MGD

Are data available to calculate CV? (Y/N) N (Minimum of 10 data points, same species, needed)
Are data available to calculate ACR? (Y/N) N (NOEC<LC50, do not use greater/less than data)

IWC_a	13.83604289	%	Plant flow/plant flow + 1Q10
IWC_c	5.83090379	%	Plant flow/plant flow + 7Q10
Dilution, acute	7.2275		100/IWCa
Dilution, chronic	17.15		100/IWCc
WLA_a	2.16825		Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	17.15		Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	21.6825		ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10		LC50/NOEC (Default is 10 - If data are available, use tables Page 3)
CV-Coefficient of variation	0.6		Default of 0.6 - If data are available, use tables Page 2)
Constants eA	0.4109447		Default = 0.41
eB	0.6010373		Default = 0.60
eC	2.4334175		Default = 2.43
eD	2.4334175		Default = 2.43 (1 samp) No. of sample 1
$LTA_{a,c}$	8.910308458		WLAa,c X's eA
LTA_c	10.3077897		WLAc X's eB
MDL** with $LTA_{a,c}$	21.68250053	TU_c	NOEC = 4.612014 (Protects from acute/chronic toxicity)
MDL** with LTA_c	25.08315583	TU_c	NOEC = 3.986739 (Protects from chronic toxicity)
AML with lowest LTA	21.68250053	TU_c	NOEC = 4.612014 Lowest LTA X's eD

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

MDL with $LTA_{a,c}$	2.168250053	TU_a	LC50 = 46.120142	%
MDL with LTA_c	2.508315583	TU_a	LC50 = 39.867392	%

Acute Endpoint/Permit Limit

ACUTE	2.16825606	TUa	LC_{50} =	47	% Use as	2.12 TUa
ACUTE WLAa	2.16825					

Use as LC_{50} in Special Condition, as TUa on DMR

Note: Inform the permittee that if the mean of the data exceeds this TUa: 1.0 a limit may result using WLA.EXE

Chronic Endpoint/Permit Limit

CHRONIC	21.6825606	TU_c	NOEC =	5	% Use as	20.00 TU_c
BOTH*	21.6825606	TU_c	NOEC =	5	% Use as	20.00 TU_c
AML	21.6825606	TU_c	NOEC =	5	% Use as	20.00 TU_c

Use as NOEC in Special Condition, as TUc on DMR

ACUTE WLAa,c	21.6825
CHRONIC WLAc	17.15

* Both means acute expressed as chronic

Note: Inform the permittee that if the mean of the data exceeds this TUc: 8.91030804 a limit may result using WLA.EXE

% Flow to be used from MIX.EXE: N 47 % 100 %

Diffuser /modeling study?
Enter Y/N N
Acute 1 :1
Chronic 1 :1

Go to Page 2
Go to Page 3

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

**The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.

Rounded NOEC's		%
NOEC =	5	%
NOEC =	4	%
NOEC =	5	

Rounded LC50's		%
LC50 =	47	%
LC50 =	40	

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA
(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.68929666

eA = 0.410944666

Using the log variance to develop eB
(P. 100, step 2b of TSD)

δ_4^2 = 0.086177696

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC
(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD
(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296658

eD = 2.433417525

	Vertebrate IC_{25} Data or LC_{50} Data	LN of data
1	0	
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
St Dev	NEED DATA	NEED DATA
Mean	0	0
Variance	0	0.000000
CV	0	

	Invertebrate IC_{25} Data or LC_{50} Data	LN of data
1	0	
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
St Dev	NEED DATA	NEED DATA
Mean	0	0
Variance	0	0.000000
CV	0	

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring		Limit	
	% Effluent	TUc	% Effluent	TUc
Dilution series based on data mean	11.2	8.910308		
Dilution series to use for limit			5	20
Dilution factor to recommend:	0.3350068		0.2236068	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	33.5	2.99	22.4	4.47
	11.2	8.91	5.0	20.00
	3.8	26.60	1.1	89.44
	1.26	79.39	0.3	400.00
Extra dilutions if needed	0.42	236.99	0.1	1788.85
	0.14	707.42	0.0	8000.00

Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

Table 3. ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50,

enter it here:	NO DATA	$\%LC_{50}$	
	NO DATA	TUa	

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48
Comment:
See Row 161 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUa. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C138
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/08
File: WETLIM10.xls
(MIX.EXE required also)

Enter data in the cells with blue type:

Entry Date:	09/21/11	
Facility Name:	Ft Chiswell WWTP	
VPDES Number:	VA0074161	
Outfall Number:	1	
Plant Flow:	2.5	MGD
Acute 1Q10:	26.5	MGD
Chronic 7Q10:	32.3	MGD
Are data available to calculate CV? (Y/N)	N	(Minimum of 10 data points, same species, needed)
Are data available to calculate ACR? (Y/N)	N	(NOEC<LC50, do not use greater/less than data)
IWC_a	16.71681712 %	Plant flow/plant flow + 1Q10
IWC_c	7.183908046 %	Plant flow/plant flow + 7Q10
Dilution, acute	5.982	100/IWCa
Dilution, chronic	13.92	100/IWCc
WLA_a	1.7946	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	13.92	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	17.946	ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation	0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants eA	0.4109447	Default = 0.41
eB	0.6010373	Default = 0.60
eC	2.4334175	Default = 2.43
eD	2.4334175	Default = 2.43 (1 samp) No. of sample 1
$LTA_{a,c}$	7.374813586	WLAa,c X's eA
LTA_c	8.366439216	WLAc X's eB
MDL** with $LTA_{a,c}$	17.94600044 TU_c	NOEC = 5.572272 (Protects from acute/chronic toxicity)
MDL** with LTA_c	20.3590396 TU_c	NOEC = 4.911823 (Protects from chronic toxicity)
AML with lowest LTA	17.94600044 TU_c	NOEC = 5.572272 Lowest LTA X's eD

**The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

MDL with $LTA_{a,c}$	1.794600044	TU_a	LC50 = 55.722722	%
MDL with LTA_c	2.03590396	TU_a	LC50 = 49.118231	%

Acute Endpoint/Permit Limit

ACUTE	1.79460004	TUa
ACUTE WLAa	1.7946	

Use as LC_{50} in Special Condition, as TUa on DMR

LC_{50} = 56 % Use as 1.78 TUa

Note: Inform the permittee that if the mean of the data exceeds this TUa: 1.0 a limit may result using WLA.EXE

Chronic Endpoint/Permit Limit

CHRONIC	17.9460004	TU_c
BOTH*	17.9460004	TU_c
AML	17.9460004	TU_c
ACUTE WLAa,c	17.946	
CHRONIC WLAc	13.92	

* Both means acute expressed as chronic

Use as NOEC in Special Condition, as TUc on DMR

NOEC =	6	% Use as	16.66	TU_c
NOEC =	6	% Use as	16.66	TU_c
NOEC =	6	% Use as	16.66	TU_c

Note: Inform the permittee that if the mean of the data exceeds this TUc: 7.37481324 a limit may result using WLA.EXE

% Flow to be used from MIX.EXE

Acute	47	%
Chronic	100	%

Diffuser /modeling study?

Enter Y/N N

Acute	1	:1
Chronic	1	:1

Go to Page 2
Go to Page 3

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

Rounded NOEC's		%
NOEC =	6	%
NOEC =	5	%
NOEC =	6	

Rounded LC50's		%
LC50 =	56	%
LC50 =	50	

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">"), FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA

(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88926686

eA = 0.410944686

Using the log variance to develop eB

(P. 100, step 2b of TSD)

δ_4^2 = 0.086177696

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC

(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD

(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296658

eD = 2.433417525

	Vertebrate IC_{25} Data or LC_{50} Data	LN of data	Invertebrate IC_{25} Data or LC_{50} Data	LN of data
1	0		0	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA
Mean	0	0	Mean	0
Variance	0	0.000000	Variance	0
CV	0		CV	0

NEED DATA 0

0.000000

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring % Effluent	Monitoring TUc	Limit % Effluent	Limit TUc
Dilution series based on data mean	13.6	7.374813		
Dilution series to use for limit			6	16.666667
Dilution factor to recommend:	0.3682345		0.244949	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	36.8	2.72	24.5	4.08
	13.6	7.37	6.0	16.67
	5.0	20.03	1.5	68.04
	1.84	54.39	0.4	277.78
Extra dilutions if needed	0.68	147.70	0.1	1134.02
	0.25	401.10	0.0	4829.63

Table 3. Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50, enter it here: NO DATA (%LC_{50}) / NO DATA (TUa)

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUs. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C136
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

ATTACHMENT 6

303 (d) Fact Sheets

TMDL

2014 Impaired Waters

Categories 4 and 5 by Cause Group Code

New River Basin

Cause Group Code: **N29R-01-PCB** **New River, Reed Creek, Claytor Lake, Peak Creek, Stony Creek and Walker Creek**

Location: The impairment begins at the I-77 bridge crossing the New River and extends downstream to the VA/WVA State Line and includes the tributaries Peak Creek and Reed Creek as described below.

City / County: Giles Co. Montgomery Co. Pulaski Co. Radford City Wythe Co.

Use(s): Fish Consumption

Cause(s) / VA Category: PCB in Fish Tissue / 5A PCB in Water Column / 5A

The Virginia Department of Health (VDH) issued a fish consumption advisory on August 6, 2001 for polychlorinated biphenyls (PCBs) for the lower portion of the New River (Rt. 114 Bridge downstream to the VA / WVA State Line - 52.0 miles) based on fish tissue collections from Carp. An Advisory extension to Claytor dam was issued 8/06/2003 (11.47 miles) recommends that no carp be consumed in these waters and no more than two meals per month of flathead and channel catfish. The VDH PCB Fish Consumption Advisory was further extended upstream on the New River (13 miles) to the I-77 Bridge to include the lower portions of Peak Creek (4.02 miles), Reed Creek (16.35 miles) and Claytor Lake (4,287 acres) on 12/02/2004. The VDH advises consumption should not exceed two meals per month for carp and smallmouth bass. Stony Creek is a 2010 Integrated Report (IR) addition to the original 2002 303(d) Listing. The VDH level of concern is 50 parts per billion (ppb) in fish tissue.

Water column data from 2010 thru 2012 are listed below where excursions of the WQS water column criterion of 640 pg/L are contravened causing an Observed Effect (OE) or 303(d) Listing for 'PCBs in Water Column'. Water column data collection is in support of TMDL development for PCBs in the New River drainage. Sample collections are made in both wet weather (WW) and dry weather (DW) conditions.

2012 Fish tissue and water column data follow reporting exceedances of the WQS based 20 ppb fish tissue value (TV) (VDH Lower Level of Concern 50 ppb). And excursions of the WQS water column criterion of 640 pg/L. Fish tissue data are in addition to previous years collections. Fish tissue data are reviewed by the VDH in making an advisory determination. A complete listing of fish tissue collection sites and associated fish tissue data are available at http://www.deq.virginia.gov. A more detailed presentation of the data can also be found using an interactive mapping application at http://www.deq.virginia.gov. The VDH Advisory information is also available via the web at http://www.vdh.virginia.gov/Epidemiology/PublicHealthToxicology/Advisories/.

9-RDC009.00 (Near Rt. 619 at Grahams Forge) 2012 two species analyzed - Carp exceeds WQS TV of 20 ppb (5 fish composite [62.6 - 69.4 cm] at 68.24 ppb. Remaining species analyzed Smallmouth Bass (5 fish composite [21.8 - 26.6 cm] at 3.04 ppb.

9-NEW098.32 (Rt. 672 Bridge, Lighthouse) 2012 four species analyzed - Channel Catfish exceeds WQS TV of 20 ppb; (2 fish composite (70.5 - 71.5 cm) at 65.15 ppb. Remaining species analyzed Largemouth Bass (5 fish composite [34.5 - 43.1]) at 7.76 ppb; Spotted Bass (5 fish composite [34.2 - 38.2 cm]) at 11.00 ppb; and Carp (3 fish composite [45.8 - 56.5]) at 6.04 ppb.

9-PKC007.82 (Route 99 Bridge) 2012 three species analyzed - Stoneroller exceeds WQS criterion of 20 ppb (15 fish comp. [14.3 - 16.0 cm] at 33.18 ppb. Remaining species analyzed Rock Bass (5 fish comp. [16.7 - 18.6 cm]); at 10.49 ppb) and Redbreast Sunfish (5 fish comp. [14.3 - 18.1 cm]; at 3.01 ppb).

9-PKC004.65 (Rt. 100 Bridge) 2012 five species analyzed. Channel catfish exceeds WQS criterion of 20 ppb (2 fish composite [63.1 - 69.0 cm] at 33.15 ppb. Remaining species analyzed Largemouth Bass (5 fish composite [33.4 - 40.8 cm]; @2.68 ppb), Carp 2 sizes (4 fish composite [54.6 - 62.0 cm]; @2.32 ppb) and (4 fish composite [54.6 - 62.0 cm]; @9.16 ppb) and Smallmouth Bass (3 fish composite [35.3 - 42.6 cm]; @6.90 ppb).

9-NEW088.86 (New River Claytor Lake at Dam) 2012 six species analyzed - Flathead Catfish exceeds WQS criterion of 20 ppb (2 fish composite [83.0 - 87.5 cm]) at 86.67 ppb. Remaining species analyzed Carp (4 fish composite [56.5 - 67.0 cm] at

New River Basin

2.05 ppb; Channel Catfish (1 fish [58.8 cm]) at 7.43 ppb; Largemouth Bass (5 fish composite [32.5 - 34.5 cm] at 0.36 ppb; Smallmouth Bass (4 fish composite [27.0 - 32.2 cm] at 0.88 ppb and Spotted Bass (3 fish composite [28.8 - 36.8 cm] at 0.00 ppb.

9-NEW085.94 (New River downstream of Claytor Dam) 2012 two species analyzed - Flathead Catfish exceeds WQS criterion of 20 ppb (5 fish composite [57.5 - 70.3 cm]) at 33.74 ppb. Remaining species analyzed Carp (5 fish composite [62.6 - 81.0 cm] at 11.27 ppb.

9-NEW081.72- (Route 11 Bridge - at Radford) 2010 water column PCB WQS criterion of 640 pg/L: Dry Weather (DW) 320 pg/L - 'FS'; Wet Weather (WW) exceeds at 4,739- 'OE'.

9-NEW079.19 (New River below Radford University) 2012 one species two exceeding composites analyzed - Carp exceeds WQS criterion of 20 ppb (2 fish composite [67.5 - 76.5 cm] at 53.28 ppb and Carp exceeding (2 fish composite [76.8 - 83.6 cm] at 94.85 ppb.

9-NEW066.90 (New River at Whitethorne) 2012 one species analyzed exceeds WQS criterion of 20 ppb Carp (1 fish [72.0 cm] at 125.58 ppb.

9-WLK004.34 (Route 622 Bridge - Giles Co.) Water column samples find two excursions of the WQS criterion of 640 pg/L. 2010 Wet Weather (WW) at 1,706 pg/L and 2011 WW at 649 pg/L.

9-NEW050.70 (New River near Pembroke) 2012 three species analyzed Carp exceeds WQS criterion of 20 ppb (2 fish composite [67.5 - 71.6 cm] at 419.87 ppb and Channel Catfish (1 fish [58.1 cm] at 23.26 ppb. Remaining species analyzed Flathead Catfish (1 fish [51.4 cm] at 9.60 ppb.

9-NEW038.71 (New River below Celeanse) 2012 two species analyzed - Each of the following exceed the WQS criterion of 20 ppb. Carp (2 fish composite [68.1 - 69.0 cm] at 355.63 ppb and Flathead Catfish (1 fish [56.0 cm] at 25.39 ppb. 2010 water column PCB DW- 129 pg/L- 'FS; Wet 784 pg/L- 'OE' and
2011 water column PCB Wet- 222 pg/L- 'FS'

9-NEW030.15 (Route 460 Bridge at Glen Lyn) 2012 one species analyzed - Each of the following exceed the WQS criterion of 20 ppb. Carp 1 (1 fish [85.0 cm] at 234.01 ppb; Carp 2 (2 fish composite [72.5 - 74.8 cm]) at 448.15 ppb.

9-NEW031.00 (Above Glen Lyn) 2010 water column PCB DW- 66 pg/L- 'FS'; WW- 841 pg/L- 'OE'.

9-NEW028.95 (New River below Glen Lyn) 2010 water column PCB WW- 710 pg/L- 'OE'. 2011 water column PCB DW- 110 pg/L- 'FS'; WW- 400 pg/l- 'FS'.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAS-N08R_NEW01A02 / New River / Mainstem from Reed Creek confluence downstream to Reed Island Creek confluence, WQS Section 2.	5A PCB in Fish Tissue	2006	2018	5.71
VAS-N11R_RDC01B06 / Reed Creek / Lower mainstem from Rt 52 bridge downstream to Miller Creek confluence, WQS Section 2.	5A PCB in Fish Tissue	2006	2018	0.60
VAS-N11R_RDC02B02 / Reed Creek / Reed Creek from Miller Creek at Max Meadows downstream to the Glade Creek confluence, WQS Section 2g.	5A PCB in Fish Tissue	2006	2018	6.08
VAS-N11R_RDC03B04 / Reed Creek / From New River confluence upstream to the Glade Creek confluence, WQS Section 2.	5A PCB in Fish Tissue	2006	2018	9.87

2014 Impaired Waters

Categories 4 and 5 by Cause Group Code

New River Basin

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N16L_NEW01A02 / Claytor Lake (New River) / Claytor Lake from its impounding structure upstream to the Claytor State Park Cabins.	5A PCB in Fish Tissue	2006	2018	1,196.84
VAW-N16L_NEW01B14 / Claytor Lake (New River) / Claytor Lake from the Claytor State Park Cabins upstream to the former Burlington Industries water intake.	5A PCB in Fish Tissue	2006	2018	602.03
VAW-N16L_NEW02A02 / Claytor Lake (New River) / Claytor Lake from the Claytor State Park Cabins upstream to the confluence of Peak Creek	5A PCB in Fish Tissue	2006	2018	278.52
VAW-N16L_NEW03A02 / Claytor Lake (New River) / Claytor Lake from the confluence of Peak Creek upstream to the end of the WQS public water supply (PWS) designation. The segment ends five miles upstream of the former Burlington Industries intake.	5A PCB in Fish Tissue	2006	2018	671.89
VAW-N16L_NEW04A02 / Claytor Lake (New River) / Claytor Lake from the end of the Burlington WQS public water supply (PWS) designation upstream to the Pulaski County PSA intake.	5A PCB in Fish Tissue	2006	2018	447.80
VAW-N16L_NEW05A02 / Claytor Lake (New River) / Claytor Lake from the Pulaski County PSA intake upstream to the end of the WQS public water supply (PWS) designation. Five miles upstream from the Pulaski County PSA intake.	5A PCB in Fish Tissue	2006	2018	660.27
VAW-N16L_NEW06A02 / Claytor Lake (New River) / Claytor Lake from the upstream end of the Pulaski County PSA WQS public water supply (PWS) designation upstream to the backwaters of Claytor Lake at Allisonia.	5A PCB in Fish Tissue	2006	2018	151.76
VAW-N16R_NEW01A00 / New River / This section of the New River extends from the mouth of Big Reed Island Creek downstream to the backwaters of Claytor Lake Class IV sec. 2c (NE43).	5A PCB in Fish Tissue	2006	2018	0.61
VAW-N17L_PKC01A10 / Claytor Lake (Peak Creek) / Peak Creek from its confluence with the New River upstream to the end of the WQS public water supply (PWS) designation.	5A PCB in Fish Tissue	2002	2014	216.86
VAW-N17L_PKC02A10 / Claytor Lake (Peak Creek) / Peak Creek from the end of the WQS public water supply (PWS) designation upstream to its backwaters.	5A PCB in Fish Tissue	2002	2014	77.74
VAW-N17R_PKC01A00 / Peak Creek / This portion of Peak Creek begins just downstream of the Rt. 99/Norfolk Southern crossing extending downstream to the inundation of Peak Creek in Claytor Lake (NE46).	5A PCB in Fish Tissue	2002	2014	1.83
VAW-N17R_PKC02A00 / Peak Creek / The segment begins downstream of the Washington Ave. Bridge (~0.20 miles) and extends on downstream to just below the Rt. 99 Bridge/Norfolk Southern Railway crossing of Peak Creek (NE46).	5A PCB in Fish Tissue	2002	2014	1.66

2014 Impaired Waters

Categories 4 and 5 by Cause Group Code

New River Basin

Assessment Unit / Water Name / Description	Cause	Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N17R_PKC03A00 / Peak Creek / This portion of Peak Creek extends from the mouth of Tract Fork to downstream of the Washington Ave. Bridge (~0.20 miles) (NE46).	5A	PCB in Fish Tissue	2006	2014	0.51
VAW-N18R_NEW01A00 / New River / New River mainstem from the Watershed boundary, Crab Creek mouth, upstream to approximately one mile downstream of the Rt. 11 Bridge; end of the WQS public water supply (PWS) section (NE57).	5A	PCB in Fish Tissue	2006	2018	3.33
VAW-N18R_NEW02A00 / New River / New River mainstem from approximately one mile downstream of the Rt. 11 Bridge upstream to the Radford City intake (NE57).	5A	PCB in Fish Tissue	2006	2018	3.72
VAW-N18R_NEW03A00 / New River / New River mainstem from the City of Radford water intake upstream to the confluence of Little River (NE57).	5A	PCB in Fish Tissue	2006	2018	2.14
VAW-N18R_NEW04A00 / New River / New River mainstem waters from the mouth of Little River upstream to Claytor Dam (NE57).	5A	PCB in Fish Tissue	2006	2018	0.60
VAW-N22R_NEW01A00 / New River / The New River mainstem from the confluence of Back Creek downstream to the Watershed Boundary at the Montgomery / Giles County Line (NE62).	5A	PCB in Fish Tissue	2002	2014	3.44
VAW-N22R_NEW02A00 / New River / New River mainstem from the Radford Army Arsenal Plant downstream intake near Whitethorne downstream to the confluence of Back Creek (NE62).	5A	PCB in Fish Tissue	2002	2014	2.86
VAW-N22R_NEW02B14 / New River / New River mainstem from the mouth of Toms Creek downstream to the RAAP downstream intake (NE62).	5A	PCB in Fish Tissue	2002	2014	0.51
VAW-N22R_NEW03A00 / New River / New River mainstem from the confluence of Stroubles Creek downstream to the mouth of Toms Creek (NE59).	5A	PCB in Fish Tissue	2002	2014	4.09
VAW-N22R_NEW04A00 / New River / New River mainstem from the Radford Army Arsenal Plant upstream intake/Pepper's Ferry Region POTW outfall downstream to the confluence of Stroubles Creek (NE59).	5A	PCB in Fish Tissue	2002	2014	2.32
VAW-N22R_NEW05A00 / New River / New River mainstem from the Blacksburg /Christiansburg /VPI Authority intake at Rt. 114 downstream to the Radford Army Arsenal Plant upstream intake / Pepper's Ferry Regional POTW outfall (NE59).	5A	PCB in Fish Tissue	2002	2014	1.76
VAW-N22R_NEW06A00 / New River / New River mainstem from the Watershed Boundary at the Crab Creek confluence downstream to the Blacksburg /Christiansburg /VPI Authority intake (NE59).	5A	PCB in Fish Tissue	2006	2018	1.72

2014 Impaired Waters

Categories 4 and 5 by Cause Group Code

New River Basin

Assessment Unit / Water Name / Description	Cause	Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N23R_NEW01A00 / New River / New River mainstem from the Giles/Montgomery County Line downstream to the confluence of Sinking Creek (NE63).	5A	PCB in Fish Tissue	2002	2014	5.47
VAW-N24R_NEW01A00 / New River / New River mainstem from the confluence of Stony Creek upstream to the mouth of Walker Creek on the New River (NE74).	5A	PCB in Fish Tissue	2002	2014	3.87
VAW-N24R_NEW02A00 / New River / New River mainstem waters from the mouth of Walker Creek upstream to the confluence of Little Stony Creek with the New River (NE74).	5A	PCB in Fish Tissue	2002	2014	2.00
VAW-N24R_NEW03A00 / New River / New River mainstem waters from the confluence of Little Stony Creek upstream to mouth of Sinking Creek on the New River. (NE74)	5A	PCB in Fish Tissue	2002	2014	3.87
VAW-N28R_SNC01A00 / Stony Creek / Stony Creek mainstem waters from its mouth on the New River upstream to Chemical Lime Company's outfall on Stony Creek (NE75).	5A	PCB in Fish Tissue	2010	2014	1.36
VAW-N28R_SNC02A00 / Stony Creek / Stony Creek mainstem waters from the Chemical Lime Company outfall on Stony Creek upstream to the Kimballton Branch confluence on Stony Creek (NE75).	5A	PCB in Fish Tissue	2010	2014	0.63
VAW-N28R_SNC03A00 / Stony Creek / Stony Creek mainstem waters from the confluence of Kimballton Branch upstream to the mouth of Laurel Branch (NE75).	5A	PCB in Fish Tissue	2010	2014	1.69
VAW-N28R_SNC04A00 / Stony Creek / Stony Creek mainstem from the confluence of Laurel Branch upstream to the mouth of Pine Swamp Branch (NE75).	5A	PCB in Fish Tissue	2010	2014	4.69
VAW-N29R_NEW01A02 / New River / New River mainstem from the backwaters of Bluestone Reservoir, Route 460, to the confluence of Rich Creek.	5A	PCB in Fish Tissue	2002	2014	3.20
VAW-N29R_NEW02A02 / New River / New River mainstem from the mouth of Rich Creek upstream to the confluence of Wolf Creek.	5A	PCB in Fish Tissue	2002	2014	3.55
VAW-N29R_NEW03A02 / New River / New River mainstem from the confluence of Wolf Creek upstream to the Celanese Acetate Plant outfalls.	5A	PCB in Fish Tissue	2002	2014	2.79
VAW-N29R_NEW04A02 / New River / New River mainstem from the Celeanse Acetate Plant outfalls upstream to the watershed boundary at the confluence of Stony Creek.	5A	PCB in Fish Tissue	2002	2014	5.78
VAW-N35R_NEW01A00 / New River / New River mainstem from the Rt. 460 Bridge at Glen Lyn downstream to the Virginia/West Virginia State Line.	5A	PCB in Fish Tissue	2002	2014	6.88

2014 Impaired Waters

Categories 4 and 5 by Cause Group Code

New River Basin

New River, Reed Creek, Claytor Lake, Peak Creek, Stony Creek and Walker Creek	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Fish Consumption			
PCB in Fish Tissue - Total Impaired Size by Water Type:		**4,303.71**	**99.14**

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N25R_WLK01A00 / Walker Creek / Walker Creek mainstem waters from its mouth on the New River upstream to the Cecil Branch confluence at the Rt. 100 crossing (NE73).	5A PCB in Water Column	2014	2026	8.39

New River, Reed Creek, Claytor Lake, Peak Creek, Stony Creek and Walker Creek	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Fish Consumption			
PCB in Water Column - Total Impaired Size by Water Type:			**8.39**

Sources:

Source Unknown

ATTACHMENT 7

T & E Species

Wyatt, Frederick (DEQ)

From: nhreview (DCR)
Sent: Tuesday, July 26, 2016 9:04 AM
To: Wyatt, Frederick (DEQ)
Cc: Orndorff, Wil (DCR)
Subject: VA0074161, Fort Chiswell WWTP
Attachments: 71700, DEQ VA0074161, Fort Chiswell WWTP.pdf

Mr. Wyatt,

Please find attached the DCR-DNH comments for the above referenced project. The comments are in pdf format and can be printed for your records. Also species rank information is available at http://www.dcr.virginia.gov/natural-heritage/help.shtml for your reference.

An updated information services order form is located on the Natural Heritage website at:
http://www.dcr.virginia.gov/natural-heritage/nhserviceform/?non_fee

Thank you for the opportunity to comment on this project

S. Rene' Hypes
Project Review Coordinator
Department of Conservation and Recreation
Division of Natural Heritage
600 East Main Street, 24th Floor
Richmond, Virginia 23219
804-371-2708 (phone)
804-371-2674 (fax)
rene.hypes@dcr.virginia.gov

Conserving VA's Biodiversity through Inventory, Protection and Stewardship
http://www.dcr.virginia.gov/natural-heritage/

Molly Joseph Ward
Secretary of Natural Resources

Clyde E. Cristman
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

Rochelle Altholz
Deputy Director of Administration and Finance

David C. Dowling
Deputy Director of Soil and Water Conservation and Dam Safety

Thomas L. Smith
Deputy Director of Operations

July 26, 2016

Fred Wyatt
DEQ – Southwest Regional Office
355-A Deadmore Street
Abingdon, VA 24210

Re: VA0074161, Fort Chiswell WWTP

Dear Mr. Wyatt:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Candy darter (*Etheostoma osburni*, G3/S1/NL/NL) has been historically documented downstream in Reed Creek. The Candy darter occurs in the New River drainage of Virginia and the Appalachian Plateaus of West Virginia (Jenkins and Burkhead, 1994). It inhabits rocky, clear, and small to large creeks in unsilted runs and riffles (Burkhead and Jenkins, 1991).

Threats to the habitat of this species include siltation and turbidity (Burkhead and Jenkins, 1991). In addition, the stocking of trout may result in predation of the Candy darter while the spawning sites may be trampled by wading trout fishermen (Burkhead and Jenkins, 1991).

This project is situated on karst-forming carbonate rock and can be characterized by sinkholes, caves, disappearing streams, and large springs. If such features are encountered during the project, please coordinate with Wil Orndorff (540-230-5960, Wil.Orndorff@dcr.virginia.gov) to document and minimize adverse impacts. Discharge of runoff to sinkholes or sinking streams, filling of sinkholes, and alteration of cave entrances can lead to surface collapse, flooding, erosion and sedimentation, groundwater contamination, and degradation of subterranean habitat for natural heritage resources. If the project involves filling or "improvement" of sinkholes or cave openings, DCR would like detailed location information and copies of the design specifications. In cases where sinkhole improvement is for stormwater discharge, copies of VDOT Form EQ-120 will suffice. New "Karst Assessment Guidelines" developed by the Virginia Cave Board for land development can be found at http://www.dcr.virginia.gov/natural_heritage/documents/karst_assessment_guidelines.pdf.

To minimize impacts to aquatic resources, DCR recommends the use of UV/ozone to replace chlorination disinfection and utilization of new technologies as they become available to improve water quality.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-

listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dgif.virginia.gov.

Should you have any questions or concerns, feel free to contact René Hypes at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,

S. René Hypes
Project Review Coordinator

CC: Wil Orndorff, DCR-Karst

Literature Cited

Burkhead, Noel M. and Robert E. Jenkins. 1991. Candy darter. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia.

Jenkins, R. E., and N. M. Burkhead. 1994. Freshwater fishes of Virginia. American Fisheries Society, Bethesda, Maryland. xxiii + 1079 pp.

VaFWIS Initial Project Assessment Report Compiled on 6/30/2016, 7:33:35 AM

Help

Known or likely to occur within a **2 mile radius around point 36,57,32.0 80,55,40.0** in **197 Wythe County, VA**

View Map of Site Location

470 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 28) (28 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
070118	FTSE	II	Crayfish, Big Sandy	Cambarus callainus		BOVA
050022	FTST		Bat, northern long-eared	Myotis septentrionalis		BOVA
060080	SE	II	Heelsplitter, Tennessee	Lasmigona holstonia		BOVA
050020	SE		Bat, little brown	Myotis lucifugus lucifugus		BOVA
050027	SE		Bat, tri-colored	Perimyotis subflavus		BOVA
040096	ST	I	Falcon, peregrine	Falco peregrinus		BOVA
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus		BOVA
060081	ST	II	Floater, green	Lasmigona subviridis		BOVA,Habitat
060140	ST	IV	Pistolgrip	Tritogonia verrucosa		BOVA
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
100248	FS	I	Fritillary, regal	Speyeria idalia idalia		BOVA
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus		BOVA
070010	FS	III	Amphipod, James Cave	Stygobromus abditus		BOVA
100001	FS	IV	fritillary, Diana	Speyeria diana		BOVA
010199	CC	II	Darter, candy	Etheostoma osburni	Yes	BOVA,Habitat,SppObs
020020	CC	II	Hellbender, eastern	Cryptobranchus alleganiensis alleganiensis		BOVA
030012	CC	IV	Rattlesnake, timber	Crotalus horridus		BOVA
040372		I	Crossbill, red	Loxia curvirostra		BOVA
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius		BOVA,Habitat
040319		I	Warbler, black-throated green	Setophaga virens		BOVA
040306		I	Warbler, golden-winged	Vermivora chrysoptera		BOVA
020011		II	Frog, mountain chorus	Pseudacris brachyphona		BOVA,Habitat
020030		II	Salamander, green	Aneides aeneus		BOVA
040052		II	Duck, American black	Anas rubripes		BOVA
040213		II	Owl, northern saw-whet	Aegolius acadicus		BOVA
040320		II	Warbler, cerulean	Setophaga cerulea		BOVA
040304		II	Warbler, Swainson's	Limnothlypis swainsonii		BOVA
040266		II	Wren, winter	Troglodytes troglodytes		BOVA

To view **All 470 species** View 470

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Bat Colonies or Hibernacula: **Not Known**

Anadromous Fish Use Streams

N/A

Colonial Water Bird Survey N/A

Threatened and Endangered Waters

N/A

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Habitat Predicted for Aquatic WAP Tier I & II Species (2 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species					View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name				
Miller Creek (50500011)	SS	010199	CC	II	Darter, candy Etheostoma osburni	Yes
Reed Creek (50500011)	ST	010199	CC	II	Darter, candy Etheostoma osburni	Yes
		060081	ST	II	Floater, green Lasmigona subviridis	

Habitat Predicted for Terrestrial WAP Tier I & II Species (2 Species)

View Map of Combined Terrestrial Habitat Predicted for 2 WAP Tier I & II Species Listed Below

ordered by Status Concern for Conservation

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius	Yes
020011		II	Frog, mountain chorus	Pseudacris brachyphona	Yes

Public Holdings: (1 names)

Name	Agency	Level
Wytheville National Fish Hatchery	U.S. Fish and Wildlife Service	Federal

Compiled on 6/30/2016, 7:33:35 AM I745985.0 report=IPA searchType= R dist= 3218 poi= 36,57,32.0 80,55,40.0

PixelSize=64; Anadromous=0.027543; BECAR=0.012907; Bats=0.014612; Buffer=0.099993; County=0.083191; Impediments=0.014025; Init=0.175432; PublicLands=0.034455; SppObs=0.243105; TEWaters=0.015342; TierReaches=0.07684; TierTerrestrial=0.110965; Total=1.05596; Tracking_BOVA=0.223586; Trout=0.013813

Tier Reaches Group Reed Creek (50500011)

36,57,32.0 -80,55,40.0
is the Search Point

Display	Item Location is not
at center	at map center

Show Position Rings
(•) Yes ( ) No
1 mile and 1/4 mile at the **Search Point**

Show Search Area
(•) Yes ( ) No
2 Search distance miles radius

Search Point is at map center

Base Map Choices
Topography

Map Overlay Choices
Current List: Position, Search, Observation

Map Overlay Legend

Position Rings
1 mile and 1/4 mile at the Search Point

2 mile radius Search Area

Data Observation Site

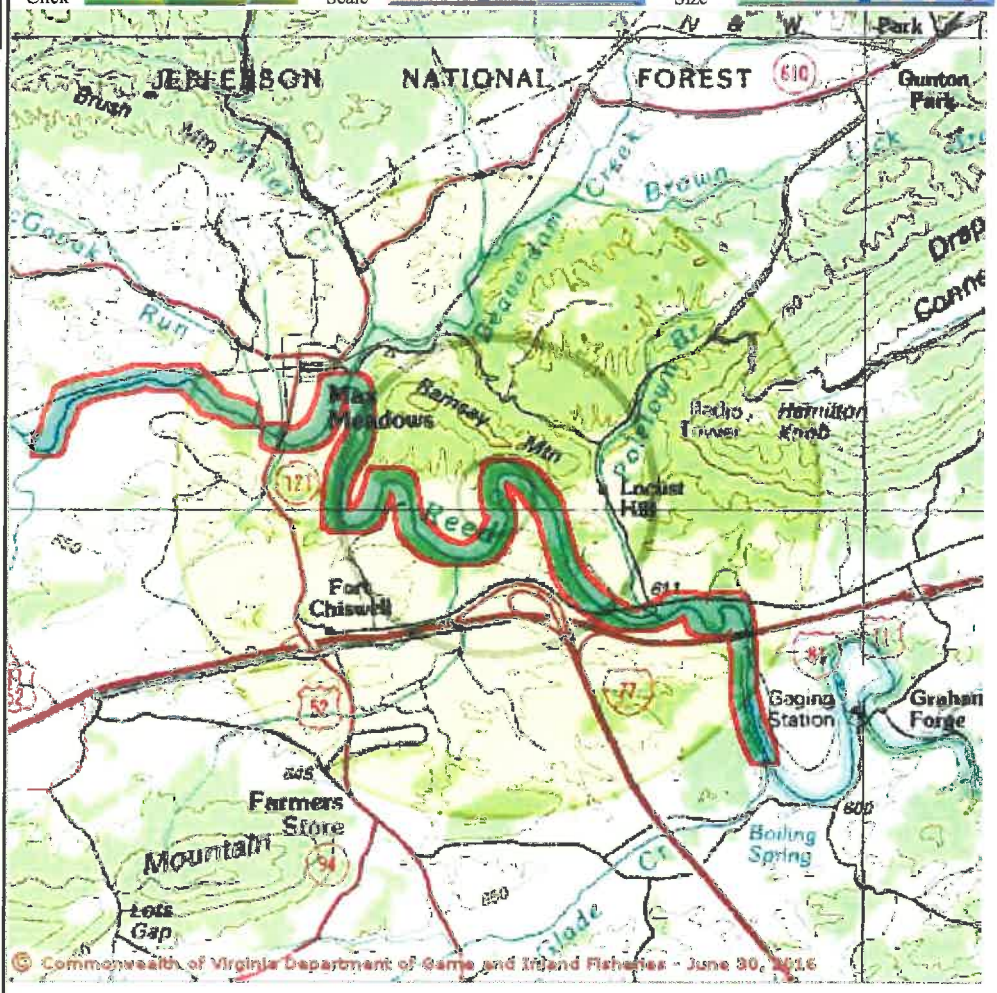
Refresh Browser Page

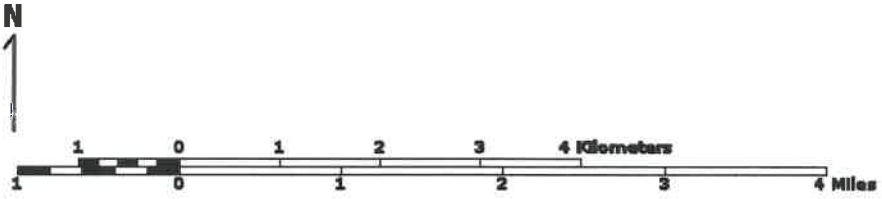
Map Click Pan

Map Scale In Zoom Out

Screen Size Small Size Big

Help





Point of Search 36,57,32.0 -80,55,40.0
Map Location 36,57,32.0 -80,55,40.0

Select **Coordinate System:**
(•) Degrees,Minutes,Seconds Latitude - Longitude
( ) Decimal Degrees Latitude - Longitude
( ) Meters UTM NAD83 East North Zone
( ) Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 17 NAD 1983 with left 501630 and top 4095114. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixles. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-

	are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network. Shaded topographic maps are from TOPO! ©2006 National Geographic http://www.national.geographic.com/topo All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries. map assembled 2016-06-30 07:34:45 (qa/qc March 21, 2016 12:20 - tn=745985.0 dist=3218 I) $poi=36.9588889 -80.9277778$query=select Convert(varchar(10),floor((minx+maxx)/2)) + ' ' + Convert (varchar(10),floor((miny+maxy)/2)) from vafwis_tables.dbo.cvTierReaches where SEG_ID in ('505000112751 ','505000112753 ','505000112755 ','505000112789 ','505000112802 ','505000112843 ')

Wyatt, Frederick (DEQ)

From: vanhde@natureserve.org
Sent: Friday, July 01, 2016 7:57 AM
To: Wyatt, Frederick (DEQ)
Subject: Fort Chiswell WWTP has completed initial review

Dear Clairise R Shaheen,

An initial review of your project, entitled 'Fort Chiswell WWTP', has been completed. The resulting report can be found here. To view the project page, shapefile and any attachments, click here. If natural heritage resources are documented or predicted within the search radius, DCR will provide additional comments via email within thirty calendar days or within 5 business days if priority service was selected. If no natural heritage resources are documented or predicted within the search radius, no further coordination is needed with this office. The report can be saved and/or printed for your files.

Thank you for submitting this project for review.

DCR-VA Natural Heritage Program

Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

Web Project ID: WEB0000005419

Client Project Number: VA0074161

PROJECT INFORMATION

TITLE: Fort Chiswell WWTP

DESCRIPTION: Reissuance of VPDES permit for 1.25 MGD facility

EXISTING SITE CONDITIONS: Existing discharge to Reed Creek at river mile 9-RDC014.11 with estimated complete mix at 200 feet at low flow. The facility discharges through a diffuser.

QUADRANGLES: Max Meadows

COUNTIES: Wythe

Latitude/Longitude (DMS): 36°57'32.2225"N / 80°55'40.1993"W

Acreage: 0 acres

Comments: There is no proposed expansion or upgrade of this facility for this reissuance. Limits are based on the following flow frequencies: 1Q10: Stream Flow : 26.5 MGD 7Q10 Stream Flow: 32.3 MGD 30Q10 Stream Flow: 37.2 MGD

REQUESTOR INFORMATION

Priority: N | Tier Level: Tier II | Tax ID:

Contact Name: Fred Wyatt

Company Name: Department of Environmental Quality

Address: 355-A Deadmore Street

City: Abingdon | State: VA | Zip: 24210

Phone: 276-676-4810 Fax: 276-676-4899 Email: frederick.wyatt@deq.virginia.gov

Conservation Site	Site Type	Brank	Acreage	Listed Species Presence
RT. 614 ROADBANKS	Conservation Site	B3	24	NL
	GLNHR	NA	0	NL
	GLNHR	NA	0	NL

Natural Heritage Screening Features within Search Radius

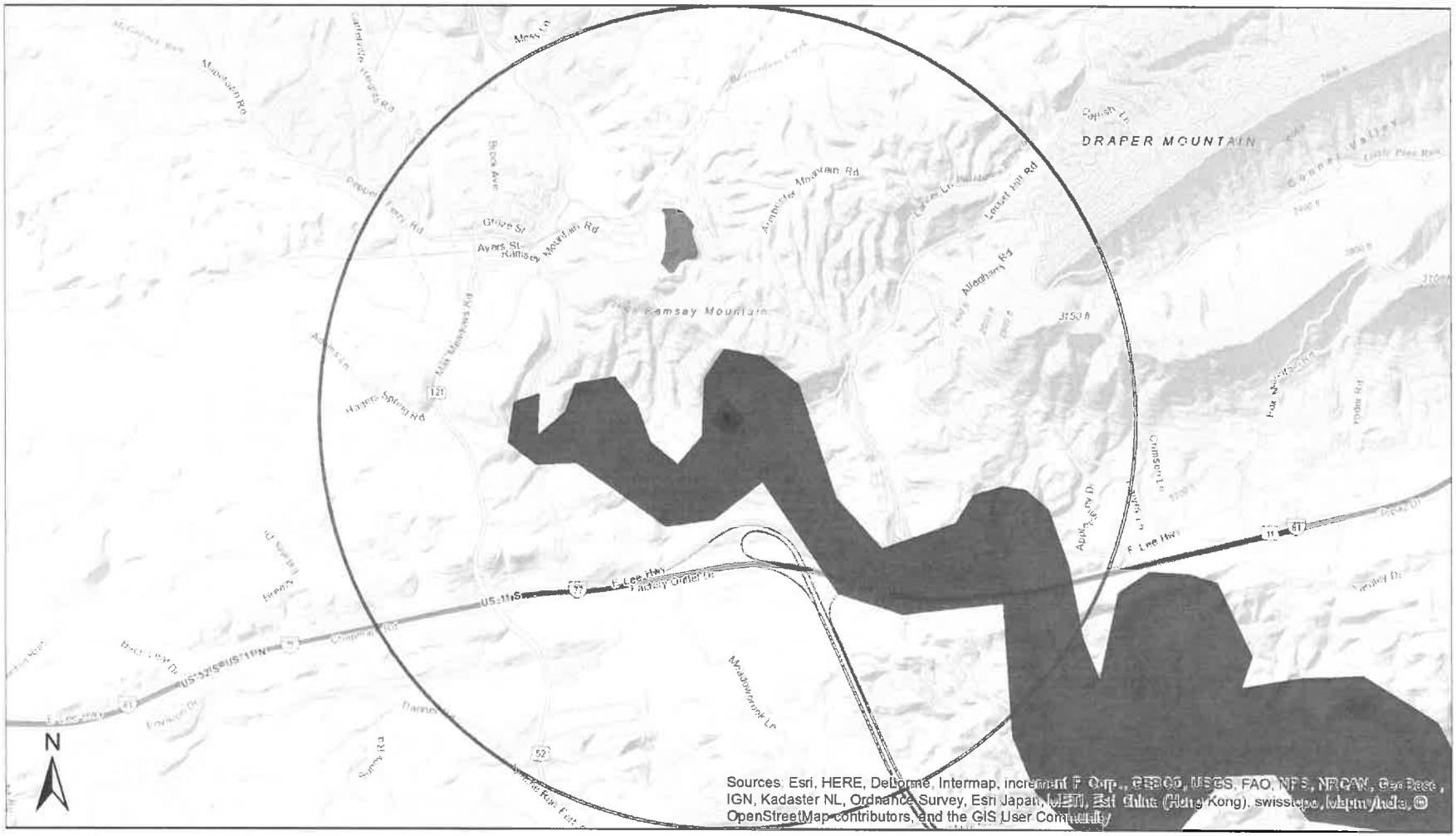
Site Name	Group Name	Common Name	Scientific Name	GRANK	SRANK	Fed Status	State Status	EO Rank	Last Obs Date	Precision
	Vertebrate Animal	Candy Darter	Etheostoma osburni	G3	S1			H	1931-05-17	S
RT. 614 ROADBANKS	Vascular Plant	Sword-leaf phlox	Phlox buckleyi	G2	S2	SOC		D	2010-06-02	M
	Vascular Plant	Dwarf Chinquapin Oak	Quercus prinoides	G5	S1			H	1965-07-13	G

Natural Heritage Resources within Search Radius

Intersecting Predictive Models
Karst Bedrock

Predictive Model Results

Fort Chiswell WWTP



Project Area	Conservation Site
Buffered	GLNHR
NH Screening Features	SCU

1:51,275

0 0.425 0.85 1.7 mi

0 0.5 1 2 km

Quads: Max Meadows

Counties: Wythe

Company: Department of Environmental Quality

Lat/Long: 365732 / -805540

Molly Joseph Ward
Secretary of Natural Resources

Clyde E. Cristman
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

The project mapped as part of this report has been searched against the Department of Conservation and Recreation's Biotics Data System for occurrences of natural heritage resources from the area indicated for this project. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics files, NATURAL HERITAGE RESOURCES HAVE BEEN DOCUMENTED within two miles of the indicated project boundaries and/or POTENTIAL HABITAT FOR NATURAL HERITAGE RESOURCES intersect the project area.

You have submitted this project to DCR for a more detailed review for potential impacts to natural heritage resources. DCR will review the submitted project to identify the specific natural heritage resources in the vicinity of the proposed project. Using the expertise of our biologists, DCR will evaluate whether your specific project is likely to impact these resources, and if so how. DCR's response will indicate whether any negative impacts are likely and, if so, make recommendations to avoid, minimize and/or mitigate these impacts. If the potential negative impacts are to species that are state- or federally-listed as threatened or endangered, DCR will also recommend coordination with the appropriate regulatory agencies: the Virginia Department of Game and Inland Fisheries for state-listed animals, the Virginia Department of Agriculture and Consumer Services for state-listed plants and insects, and the United States Fish and Wildlife Service for federally listed plants and animals. If your project is expected to have positive impacts we will report those to you with recommendations for enhancing these benefits.

There will be a charge for this service for "for profit companies": $60, plus an additional charge of $35 for 1-5 occurrences and $60 for 6 or more occurrences.

Please allow up to 30 days for a response, unless you requested a priority response (in 5 business days) at an additional surcharge of $500. An invoice will be provided with your response.

We will review the project based on the information you included in the Project Info submittal form, which is included in this report. Also any additional information including photographs, survey documents, etc. attached during the project submittal process and/or sent via email referencing the project title (from the first page of this report).

Thank you for submitting your project for review to the Virginia Natural Heritage Program through the NH Data Explorer. Should you have any questions or concerns about DCR, the Data Explorer, or this report, please contact the Natural Heritage Project Review Unit at 804-371-2708.

ATTACHMENT 8

PCBs Monitoring and Minimization

Wyatt, Frederick (DEQ)

From: Chapman, Martha (DEQ)
Sent: Thursday, June 30, 2016 9:14 AM
To: Wyatt, Frederick (DEQ)
Cc: Trent, Mark (DEQ)
Subject: Ft. Chiswell WWTP
Attachments: PCBs Special Condition May1_2008 revision.doc; Final PMP Special Condition.pdf; 2_26_2016 (ver3) New River Point Source loads .xlsx

Fred,
The proper path forward to include a special condition similar to Bluefield, Mark Richards provided the attached. You will need to reference the New River PCB TMDL. We have reached out to them as part of the New River PCB TMDL public participation so they should figure this was coming. Let me know what TMDL language you need. I have also attached a spreadsheet with the point source PCB loads for the watershed. There is a possibility the WLA will change based on the selected endpoint, I'll double check with Mark to see if anything has changed.

Thanks,
Martha

Martha Chapman
TMDL Coordinator
Department of Environmental Quality
Southwest Regional Office
355-A Deadmore Street
Abingdon, VA 24210
(276) 676-4845
martha.chapman@deq.virginia.gov
http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL.aspx

Waterbody	Facility	Permit No.	SIC	Outfall	Mean tPCB (pg/L)	Lat.	Long.	[1] DMR Monthly Ave (MGD)	Design Flow (MGD)	Baseline PCB mg/ year	TMDL Endpoint Conc. PCB pg/L	*WLA PCB mg/ year
BRRO												
	Municipal											
mainstem	Blacksburg VPI	VA0060844	4952	001	89.8	37.19138890	-80.52611110	5.282	9	**654.6**	640	**7,948.8**
mainstem	Peppers Ferry	VA0062685	4952	001	583.9	37.20277778	-80.56388889	4.166	9	**3,357.1**	640	**7,948.8**
mainstem	Christiansburg WWTF	VA0061751	4952	001	1,109.5	37.14750000	-80.52580000	2.33	6	**3,567.4**	640	**5,299.2**
mainstem	Glen Creek WWTP	VA0080837	4952	001	1,196.1	37.37333300	-80.86166700	0.0397	0.2	**65.5**	640	**176.6**
mainstem	Pearisburg WWTP	VA0085961	4952	001	3,037.9	37.34100000	-80.75400000	0.197	0.275	**825.9**	640	**242.9**
mainstem	Town of Narrows STP	VA0021113	4952	001	4,661.6	37.33300000	-80.81000000	0.152	0.25	**977.8**	640	**220.8**
mainstem	Town of Pembroke	VA0088048	4952	001	2,803	37.31000000	-80.64000000	0.081	0.2	**313.3**	640	**176.6**
SWRO												
	Municipal											
mainstem	None applicable - too small											
Reed Creek, South Fork UT	Rural Retreat WWTP	VA0021326	4952	001	1,701.1	36.8905556	-81.2525000	0.174	0.25	**408.5**	640	**220.8**
Reed Creek	Fort Chiswell WWTP	VA0074161	4952	001	1,701.1	36.9533333	-80.9325000	0.363	2.5	**852.1**	640	**2,208.0**
Reed Creek	Wytheville WWTP	VA0020281	4952	001	1,701.1	36.9383333	-81.0538889	2.059	4	**4,833.5**	640	**3,532.8**

* WLA subject to change based on selected endpoint

[1] Monthly Ave Flows from 2005-2014

Wyatt, Frederick (DEQ)

From: Chapman, Martha (DEQ)
Sent: Tuesday, March 01, 2016 9:13 AM
To: Trent, Mark (DEQ)
Cc: Nishida, David (DEQ); Wyatt, Frederick (DEQ)
Subject: FW: New River PCB Point Source Loads
Attachments: 2_26_2016 (ver3) New River Point Source loads .xlsx

Mark,

See the note below from Mark Richards explaining the attached spreadsheet with PCB loading for our 8 permits in the New River PCB TMDL.

If you have any questions just let me know.

Thanks,
Martha

From: Richards, Mark (DEQ)
Sent: Friday, February 26, 2016 12:46 PM
To: Karen Kline
Cc: Brian Benham; Dail, Mary (DEQ); Chapman, Martha (DEQ); Breeding, Robert (DEQ)
Subject: New River PCB Point Source Loads

Hi Karen,

Attached are the point source PCB loads for the New River watershed. More specifically there are five worksheets: 1) tPCB data uncorr & corrected, 2) Munis, 3) ISWGPs, 4) Industrial IPs, and 5) New R. Pt sources.

Worksheet 1 includes the tPCB data used to drive the loadings at those facilities that provided the data. An arithmetic mean tPCB conc. was calculated from the "corrected" results which in turn was the concentration used to calculate the load. In those instances where a facility did not provide data, DEQ utilized tPCB data specific to the facility type (based on Standard Industrial Classification) that was derived from a statewide database (citation is below).

Worksheet 2 = Includes baseline loads and WLAs applicable to each municipality identified by the ROs. Note the WLA will change once we finalize the appropriate endpoint.

Worksheet 3 = Includes baseline loads and WLAs from the Industrial Stormwater General Permitted facilities. These discharge exclusively as stormwater. Again, the WLA is subject to change once the appropriate endpoint is established. If there is more than one outfall at a facility, the load from each outfall is combined for a facility wide baseline load and WLA.

Worksheet 4 = Includes baseline loads and WLAs from Individual Industrial Permitted facilities. The facilities discharge continuously flowing effluent, or in some cases continuous effluent co-mingled with stormwater, and stormwater. A different approach is used to calculate the two effluent types (continuous/comingled vs stormwater) but the loadings are combined for a facility wide baseline load and WLA. DMR flow data from calendar years 2005 - 2014 were used for the continuous and co-mingled outfalls (for baseline we used the arithmetic Mean of the monthly ave flow and for the WLA we used the arithmetic Mean of the monthly

maximum flows). Note the WLA will change once we finalize the appropriate endpoint. Also be advised that the Radford Arsenal Load may still be subject to change as the full property may not be considered within the specified outfall loads – BRRO ROA permit writer must concur.

Worksheet 5 = Summary of Worksheets 2 - 4.

Citation: VDEQ. February 2016. The Relationship between Polychlorinated Biphenyls (PCBs), VPDES Wastewater/Stormwater Facilities, Stormwater Industrial General Permitted Facilities (ISWGPs), and the Standard Industrial Classification System (SIC).

Please let me know if you have any questions/comments.

Regards,
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